A Work Project, presented as part of the requirements for the Award of a Masters Degree in Finance from the NOVA School of Business and Economics.

Risk and Return: The International Expansion of EDP Renováveis

Carolina Downey de Oliveira, MST 16000423

Project carried out on the under the supervision of Professor José Neves Adelino

January 2013

I would like to thank the people whose support made this work possible: Dr. João Manso Neto, Eng. José Allen Lima, Dr. Rui Eustáquio, Eng. Pedro Galvão Pires, Dra. Ana Cristina Morais, Eng. Jorge Casillas and Professor Neves Adelino.

CASE STUDY

Risk and Return: The International Expansion of EDP Renováveis

It is March 2012 and from his new Madrid office João Manso Neto thinks of the groups of protesters marching their way to Puerta del Sol. Along with news of economic crisis, they have been a common sight on the streets of Madrid lately; but Manso Neto sees a silver lining.

Although only recently appointed as CEO of EDP Renováveis (EDPR), Manso Neto has accompanied EDPR's trajectory over the years as a member of EDP's board of directors. Calmly lighting a cigarette, he muses over EDPR's evolution and the impact of recent economic upheavals.

EDPR's pre-IPO entry into Poland characterized the company's promising growth phase in a booming market. They followed an aggressive expansion strategy with the objective of growing by 1.4 gigawatts (GW) of installed capacity per year. Entering unknown geographies, they sought robust partnerships and flexible deals, and became the 3rd largest global renewable energy player.

Nonetheless, the outlook today is quite different. As technologies mature and sovereign debt crises loom, the risk of regulatory instability has increased, threatening to change the rules mid game. At this afternoon's meeting, they would carefully consider the impact of these changes on the value of the operational Polish projects. They would also question whether the remaining options should be exercised, and how to adapt to freezing debt markets.

Furthermore, EDPR was now preparing to embark on a phase of renewed growth in a landmark partnership with their Chinese shareholders. Manso Neto would have to review the lessons learnt throughout EDPR's expansion history to ensure their continued resilience going forward. With almost a decade of EDP, and broad responsibilities including managing the Trading unit and the strategic department for energy planning, regulation and competition, his rich transversal experience makes Manso Neto the right man to steer EDPR through these future challenges.

To review the lessons however, he has to go a few years back, to the entry into the Polish market…

EDP and the Origins of EDP Renováveis

EDPR is a subsidiary of EDP (Energias de Portugal), a vertically integrated electric utility created in Portugal in 1976. It is the third largest operator in the Iberian Peninsula, with activities in generation, distribution and retailing of electricity. EDP also has a significant presence in the gas sector in the Iberian Peninsula and in the Brazilian electricity market.

EDP has historically been involved in renewable energy due to a strong presence in hydro power. A new focus on wind power began in the 1990s, mainly through acquisitions in Spain and Brazil, notably the acquisition of Hidroeléctrica del Cantábrico (HC) a Spanish utility with significant wind power assets. When the decision to expand beyond the Peninsula was taken in 2005, it was HC's assets that served as the basis, creating Nuevas Energias del Occidente (NEO). Alongside the responsibility of managing and consolidating EDP's existing wind pipeline, NEO also aimed to expand into new high growth markets in Europe and beyond, to secure their leadership position. This newly centralized management invigorated the renewables' growth strategy, and brought on a wave of acquisitions (Exhibit 2).

This was reinforced by the appointment of António Mexia as CEO of EDP Group in March 2006, who defined three strategic pillars: Controlled Risk, Superior Efficiency, and Focused Growth. Growth would be delivered through selective investments, aimed at achieving a leading position in the global renewables market, expanding Brazilian operations, and consolidating the core Iberian business. António Mexia wished to prioritize renewables, foreseeing its future potential as the group's growth engine, as well as a means of reducing risks related to carbon emissions.

A key turning point came in July 2007, when EDP entered the North American market with the acquisition of Horizon Wind Energy. In 8 months, the wind power business had increased its gross installed capacity by 70%, moving from 6th to 4th place in the global renewable energy rankings. António Mexia then decided to adopt ambitious targets to ensure that this success was maintained. Aiming for world leadership, the mandate was to grow by an additional 1400 MW/year by 2012, essentially tripling their installed capacity in 4 years (Exhibit 3).

In order to meet this objective, EDPR was created to develop renewable projects focused initially on onshore wind power. EDPR grouped Horizon and NEO among others, with Horizon becoming the platform for the North American operations, headquartered in Houston. NEO would become the European platform of EDPR, headquartered in Madrid and responsible for finding attractive, high growth European markets (Exhibit 4). In order to fund the continuation of this aggressive expansion strategy, EDPR's IPO was carried out in 2008.

The 2007 Outlook: A Market in Frenzy

Between 2000 and 2007, a number of converging factors resulted in a booming renewable energy market, with global installed capacity growing at a CAGR of 25.7% in this period led by European investments (1). At a global level, a growing demand for energy, combined with concerns over security of supply and climate change, set nations on a search for alternative, low carbon sources of energy, among which renewables took precedence. The staggering increase in Brent oil prices in this period, from $20 to $100 per barrel, was representative of fossil fuels trends, and contributed to making substitute renewable technologies more competitive.

In 1997 industrialised countries had adopted binding emission reduction targets, under the landmark agreement of the Kyoto Protocol. At the European level, the ambitious Renewable Energy Road Map was adopted in 2007, establishing the 20/20/20 targets: 20% reduction in carbon emissions, sourcing 20% of Europe's energy from renewables, and increasing energy efficiency by 20%, by 2020.

Although renewable energy technologies vary greatly (from onshore wind to solar PV), their immaturity led them to be relatively more expensive than traditional thermal and hydro resources at the time. This expense is termed the *renewable overcost*. In order to participate in electricity markets, they relied on regulatory support schemes to offset this overcost. Under the 20/20/20 Road Map, European nations were given the choice of what support schemes to implement, and were generally quite generous.

Two examples are the feed in tariff and green certificates. The feed in tariff is a mechanism by which the regulator establishes a fixed long term tariff at above market levels awarded to renewable energy producers, to cover the overcost. Green certificates are tradable commodities, which producers gain per MWh of produced energy. Demand for this commodity is created by requiring electricity distributors to source a portion of their electricity from renewable sources, or pay a penalty. Renewable producers gain extra income by selling their green certificates.

Thus, renewables' technologies were able to mature in this fertile environment for investment and research. Combined with increases in global installed capacity and higher competition between equipment suppliers, production costs decreased significantly. In 2007, onshore wind technology was becoming increasingly competitive, having experienced a price decrease of 80% over the previous 20 years (3). This was expected to further decrease to €50/MWh by 2020, becoming cheaper than the average market price between 2010 and 2020.

The combination of these revenue side incentives and cost side reductions contributed to making renewables highly attractive investments. In 2007, European installed wind capacity was expected to grow at a CAGR of 11.7% until 2015 (1). Overall, the combined effect can be seen in the World Energy Outlook 2007's base case estimates, that by 2030 OECD Europe would produce between 31-41% of its energy from renewables (4).

EDPR's Approach to New Investments in 2007

Amidst this backdrop in 2007, EDPR's Madrid based Business Development team was avidly seeking new expansion opportunities in Europe. Apart from needing to meet key targets, this portfolio diversification strategy was fundamental to risk mitigation at group level.

There was plenty of deal flow in the hot European market: financial players such as investment banks acted as brokers between project developers and financial or strategic buyers. These players provided liquidity to the market by aggregating projects at varying stages of the pipeline development (Exhibit 5) to be sold as a combined portfolio of much greater value.

All investment opportunities underwent the same analysis, although at this stage in EDPR's history the process was somewhat less formalized. Projects were sourced by the Business Initiatives team, and evaluated conjointly with the Regulation and Markets team. In the case of acquisitions, the project was then submitted for approval to EDPR's Executive Committee. If approved, it was presented to EDP Group's Investment Committee, and reviewed by the Business Analysis Department at corporate level. Finally, each individual project had to be submitted to the Group's Board of Directors for final approval.

Wind Power Market Analysis

The first step in determining promising opportunities was identifying the attractive markets. EDPR looked for markets presenting these characteristics:

- **Market Size and Growth:** EDPR sought fragmented markets with high growth potential, in which they could feasibly capture 20-25%. In order to support a local EDPR team, this share should allow EDPR to install at least 100-150MW of wind power capacity per year.
- **Regulatory Support Scheme:** as a capital intensive industry, a stable and favourable remuneration mechanism is critical for investor confidence.
- **Country Risk:** Politically stable, with good business conditions, as well as stable macroeconomic indicators.

Target Analysis: Relax Wind Parks

Manso Neto thought of how the entry into the Polish market had typified EDPR's euphoric expansion period. Poland had emerged as a promising target, with geographic and cultural proximity to core EDPR markets. Nonetheless, it was foreign territory, and they had needed to proceed with caution.

The Business Initiatives team had been searching for a deal partner in Poland for about a year when they met the local partner and shareholder of Relax Wind Parks (RWP), an industry expert with an impeccable reputation. Interestingly, this was a deal they had previously considered and rejected, having been too aggressively packaged by the financial players who held RWP shares.

Now the local partner brought a new face and value to the deal. The target RWP was a Polish wind farm developer with a portfolio of projects at different stages of development, to be acquired along

with the local management team. While RWP's strengths lay in early stage development, they lacked the experience and resources to construct, finance and operate such wind farms. The gross capacity of the portfolio was 1022 MW, split into 4 blocks of wind farms scheduled to start operating between 2009 and 2013 (Exhibit 16).

The Polish Electricity Market

Poland had to comply with the EU target of sourcing 15% its energy from renewables by 2020. This was particularly challenging since domestic generation relied heavily on coal, and renewables represented only 0.04% of the generation (Exhibit 8). Thus, the government had created very attractive incentives for renewables, and wind capacity was expected to multiply 49 times between 2007-15 (Exhibit 12).

Revenue Streams

The Polish electricity markets provided two sources of revenue for renewable projects: the brown power price and the green certificate. Brown power is the "regular" electricity market price, so called because of the thermal sources which also participate in the market. Market prices are affected by numerous factors, namely global fuel commodity prices (coal and gas), carbon prices, and the mix of energy technologies used. Polish brown power prices were structurally high due to a large proportion of coal power in the energy mix which incurred a penalty for CO_2 emissions, limited cheap hydro power resource, and low reserve margins for energy production.

Green Certificates are the Polish renewables support scheme. Renewable energy generators receive 1 certificate for every MWh they produce during 20 project years. On the demand side, electricity distributors are obliged to meet a yearly quota of electricity purchased from renewable sources, thus purchasing these certificates. This quota was regulated to grow from 5.1% in 2007 to 10.4% by 2010 (Exhibit 14). Should distributors fail to meet this quota, they had to pay a penalty which acts as the defacto cap on the market value of these certificates. Since the Polish green certificate market was characterized by significant scarcity the certificate price was expected to remain almost equal to this cap (Exhibit 17), which was revised annually and indexed to inflation.

Brown power and green certificates could be sold either through the spot market or through long term bilateral contracts. The latter are called power purchase agreements (PPA) and are celebrated with buyers such as electricity distributors or energy traders. The contract term would last for the duration of the Polish license period of 20 years, and certificates would be awarded for this same period of time.

Cost Structures

Capital intensive infrastructure projects typically break down costs into capital expenditure and operational expenditure (capex and opex). Within capex, turbines composed 70-80% of the costs, with plant balance[i] and construction costs (a.k.a. development costs) composing the remainder. As for opex, costs are broken into fixed and variable operations and maintenance (O&M) costs. EDPR

expected to transfer their low opex rates to Polish operations, thanks to their unique O&M model, internalizing key functions to achieve superior efficiency and optimization of wind resources.

From experience with European turbine contractors, the Business Development team estimated a Turbine capex of 1.3M Euros per megawatt of installed capacity, and RWP informed them to expect an average opex of 68 Zlotys (PLN) per MWh (Exhibit 16**)**. As the technologies matured, they anticipated capex cost reductions of 4% per year before inflation between 2007 and 2015 (5). In addition, turbine lifespan lay between 20-25 years, and could be extended to a technical maximum of 30 years.[ii] At the end of the Polish 20 year license period, the turbines were expected to have a 15% salvage value.

Balancing Risk and Return

Risk management played a key role in strategic planning at EDPR, ingrained in the investment analysis decision as the responsibility of the Regulation and Markets team. As such, new projects were submitted to rigorous risk and return analysis.

In terms of returns, the first important consideration was the corporate hurdle rate for new investments, requiring the average IRR of EDPR's portfolio to be 1.4x the WACC. Secondly, when considering portfolio maturity, EDPR preferred *prospects* and *pipeline* stage projects (collectively termed "*Greenfield Projects*", Exhibit 5). EDPR considered it easier to add value to projects at the initial development stage than at later implementation stages. This was due to EDPR's comparative advantage in developing Greenfield projects, given their expertise in wind resource evaluation and farm development, strong relationships with turbine suppliers and ability to benefit from scale (Exhibit 14). Nonetheless, this preference had to be balanced with the yearly goal of increasing capacity by 1.4 GW, so the portfolio also had to include ready-to-build (Tier 1) level projects.

Key Risks

EDPR identified key risks when analysing a new investment project, monitored throughout the project lifetime. These risks were classified according to two criteria: the *impact* of the risk on the project's NPV (whether through the top-line or cost of capital) and the *likelihood* of the risk occurring. Accordingly, these were (Exhibit 15):

- **Technical**: the impact of wind resource volatility and turbine functioning on production.
- **Market**: variations in energy market prices.
- **Pipeline Delivery**: proportion of pipeline which would successfully overcome permitting and development requirements.
- **Turbine Capex**: variations in turbine costs according to global commodity prices.
- **Turbine Procurement**: global turbine availability.
- **Regulatory**: regulatory alterations to renewable support schemes.
- **Financing:** variations in rates, whether shareholder loans or project finance.
- **Country:** volatility in local capital markets, macroeconomic and political environments.

Risk Mitigation

Risk mitigation can occur at two levels. The first is the process of valuing the target, pricing and structuring the deal, as a function of the *expected* cash flows and cost of capital. The second is done in practice, for instance when choosing turbine location or signing long-term sales contracts, and the effectiveness of mitigation varies with EDPR's control over the risk.

Revenues

At the evaluation stage, revenue and cost risk were typically tested through scenario analyses. For green certificate revenue, this involved estimating market prices in cases of under or oversupply, and calculating the minimum revenues necessary to maintain the desired financial return.

In practical terms, EDPR mitigated production risk by geographically diversifying the projects, offsetting localized micro climates. PPAs were the preferred sales mechanism to mitigate revenue risk when feed in tariffs were not available. The PPA established a fixed price per MWh for the duration of the contract, according to the expected market price of the year in which the project entered operation, adjusting for inflation. EDPR preferred PPAs which fixed both the brown power and the green certificate remuneration to fully mitigate market risks,[iii] even though it was also possible to establish separate PPAs for each revenue stream.

Further, in order to mitigate the risk of changing regulation, EDPR belongs to the most important wind energy associations at national and international levels, such as PIGEO, the Polish Economic Chamber of Renewable Energy. These actors play a key role in negotiations with governments, protecting the interests of wind farm investors from regulatory adjustments (6).

Turbine Procurement

EDPR's turbine procurement strategy was key to mitigating availability and cost risks. They diversified procurement among the top 5 global suppliers, reducing exposure to any individual supplier's backlog. Given the scale of their contracts, they were able to lock in competitive prices and ensure supply well in advance of construction. In fact, in 2007 they had already contracted 100% of their turbines for 2008/2009, and 70% for 2010.

Financing

In terms of financing, EDP Group supported EDPR's growth by providing shareholder loans at the market interest rates, particularly at the initial acquisition stage. At the later capex intensive construction stages, EDPR could choose between additional loans from EDP Group or project finance with debt comprising between 60-70% of EV. The choice was made when projects reached the Tier 1 level (Exhibit 5), according to the most attractive offer. EDPR tried to naturally hedge the exchange rate risk by matching their debt payments and revenues in the same currency, or alternatively using foreign exchange forwards. This hedge was unlikely in case of RWP, since the initial acquisition would be financed by Euro denominated shareholder loans, and further on, the Polish project finance market was nascent and illiquid.

Pipeline Delivery

The development of the pipeline is subject to strict regulations at national and local levels, pertaining to licensing, construction and operation of the plants, collectively termed permitting risks (Exhibit 5). These barriers had to be overcome alongside typical execution risks involved in steering projects from development to operation, while maintaining a buffer to ensure the delivery of 1.4 GW/yr.

In practice, local partnerships were *the key* to mitigating execution risk in new geographies. When entering a new unfamiliar geography, it was fundamental to have a trustworthy team with a proven track record of successfully developing and operating projects locally. RWP's management team were experts in the Polish electricity market, and had strong ties with local authorities and banks, able to facilitate the permitting and financing stages.[iv]

EDPR focuses on establishing strong and productive local partnerships. In order to align incentives with local partners and the management team, EDPR normally awarded minority equity stakes and stock options in the new company. Further, bonuses were often end-loaded, encouraging the team to stay on for a minimum period of time. While staff was mostly recruited locally, EDPR professionals from other markets (mainly Portugal and Spain) were brought in to advise and ensure knowledge transfer. This way, EDPR leveraged on their world class development and operating expertise, combined with local knowledge and contacts.

The Cost of Capital and Country Risks

In terms of country risk, the Regulation and Markets team considered several points.

Firstly, the projects in Poland would be exposed to exchange rate risk since cash flows were in multiple currencies. Within limits, they sought an ideal mix of currencies which would minimize overall currency volatility. In the case of RWP, turbine contracts were in Euros (EUR), and revenues and opex in Polish Zlotys (PLN). Financing through shareholder loans was in EUR, and project finance either in EUR or PLN. In order to account for this risk in the project valuation, all cash flows were converted into PLN. Following purchasing power parity (PPP) theory, it is only necessary to manage changes in relative rates of inflation in the short term, since over the long term currencies revert to PPP.[v]

Importantly, the cost of capital was calculated in PLN, which meant converting EUR based government rates, risk free rates, and cost of debt into PLN.[vi] Further, the cost of capital incorporated a premium for operating in Poland, which the team felt captured the inherent country risk, as the spread between the Polish sovereign yield and a benchmark rate for low risk European governments. Finally, betas varied according to the projects' type of sales channel, whether PPAs or merchant sales (Spot Market). Accordingly, PPA betas were expected to have lower correlation with the market.

The Deal

When entering new geographies, the Business Development team was particularly wary of paying a foreigners' fee – an unfair premium given their unfamiliarity with the local market conditions and

execution probabilities. Since wind power was still an emerging technology in Poland, there was limited understanding of the average productivity which could be expected from these wind farms given the climate, and fears that the load factors might be overestimated by RWP (Exhibit 16). Moreover, they were well aware that it was unlikely that all projects would reach the operational stage. But *how* unlikely? They had to rely on their experience and on local partners, meanwhile designing a deal to ensure incentive alignment and limit future risks.

When pricing a new acquisition, the team evaluates permitting and execution risks, and assigns a probability to each block of wind farms, representing the probability of successfully reaching the operational stage (Exhibit 5 shows average probabilities in mature EDPR markets). This was known as the *execution rate*, and the acquisition price was a function of this rate and negotiations with the current owners. The price was broken down into an upfront payment and the success fee, tied to key milestones, typically each additional MW successfully installed. This staggered the investment and reduced the risk of overpayment in the event of non-implementation.

While the objective was always to minimize the proportion of upfront payment, they recognized also that that the true value of the target was not restricted to the promised portfolio. They were in fact purchasing an option, firstly to build these projects once they reached the ready-to-build stage, and secondly, to gain access the promising Polish and Eastern European markets.

The Decision

Manso Neto recalled the Board's deliberations when presented with this Polish investment. On one hand, it had appeared to be a valuable opportunity. But it was also a significant step into unknown territory; the decision to invest had meant deciding at which price it would be worth the risk...

2012 Outlook: A Cautious Market

"In dire times, electricity is an area governments tend to intervene when they need money…"[vii]

Five years on, Manso Neto is aware that the company has fully blossomed since the Polish acquisition. Following a successful IPO in 2008, EDPR pursued an aggressive expansion strategy and drew on its American and European platforms to become a powerhouse of the industry, as the 3rd largest global player.

Structures and processes have been formalized. A Risk Management function has been created incorporating Regulation and Markets, responsible in part for evaluating investment proposals. Risk management is involved throughout the evaluation and decision making process, and projects require their approval to be submitted to the executive committee.

Nonetheless, the path has not been without its pitfalls. Although EDP Group still regards EDPR as the growth engine for the future, the industry has suffered severe cutbacks, and the market has penalized EDPR's stock price along with its peers (Exhibit 21). Indeed the removal of two key EDPR competitors from the stock exchange was a sign of the downturn. EDF Energies Nouvelles and Iberdrola Renovables, the renewables arms of two major European utilities, were both bought back by their parent companies in July 2011. Despite their previously successful IPOs, this signalled management's belief that stock prices were undervalued by the market.

The Double Crises

The legacy of the financial crisis, compounded by the European sovereign debt crisis, is casting its shadow over the global renewable energy market. In two key EDPR markets, Spain and Portugal, harsh economic conditions are causing governments to review the economic regulation of electricity systems. Particularly in Spain, the political decision to keep energy prices low for final consumers has resulted in a huge financial problem due to the mismatch between these prices and the actual costs of producing electricity.

In order to address one part of this issue, European governments have decided to reduce the level of renewables' incentive schemes, recognising also that capex costs are falling as technologies mature. While this may be fair for new projects, it may result in significant losses when such amendments refer to past or already operational projects (termed *retroactive amendments*). The impact of retroactive amendments on EDPR's Iberian operations were generally limited, mitigated by negotiations with governments through trade associations. Moreover, EDPR had not been planning further expansion in these geographies in the near future.

Following on from its Western peers, the Polish government announced amendments to the country's Renewable Energy Act in December 2011 (8), citing the scheme's overcosts as the main reason for cut backs. The first version proposed to differentiate incentives according to the type of renewable technology, prioritising less competitive technologies such as solar photovoltaics, as well as reducing incentives in accordance with remaining useful asset life. This meant the green certificate would only

be available for the first 15 years of a project's life, and the value of the certificates for onshore wind projects would fall by 25% (9).

Consequently, many good projects were on hold as banks and investors refused to lend before regulatory clarity emerged, with the final version of the bill only expected mid-2013. This explained the dwindling enthusiasm for renewables seen across Europe, in marked contrast to the pre-crisis hey days.

Capital Scarcity

With some Polish projects nearing the construction phase, EDPR now faces much tougher financing conditions than in the past. The two financing mechanisms used, shareholder loans and project finance, each present their own set of challenges.

Shareholder Loans

The dual crisis has impacted EDP Group's access to credit markets particularly badly, facing historically high costs of debt. Two factors contributed to this. Firstly, their comparatively high leverage ratios, caused in part by an increase in regulatory receivables and the need to finance their growth strategy. Secondly, the high perceived correlation between EDP's creditworthiness and that of the Portuguese sovereign (Exhibit 22) has meant that EDP suffered significantly from the Portuguese sovereign debt crises, in the form of consecutive credit rating downgrades (Exhibit 25). The necessity to deleverage has become one of EDP's top priorities, aiming to achieve a Net Debt/EBITDA ratio of less than 3.0 by 2015, from 4.3 in 2012.

Financial Innovation

EDPR had to adapt to reconcile the deleveraging objective and the reduced availability of shareholder loans with the necessity of growth. The new strategy is to use asset rotation and self-funding, alongside project finance. The latter however was also facing difficulties in Europe, as decreasing lending capacity caused upward pressure on margins. Banks were becoming increasingly selective, preferring strong domestic clients with established relationships (9).

Asset rotation was an innovation for EDPR. Traditionally, their business model has been that of developer, owner and operator of these wind farms. However, they are considering becoming partial owners or even pure developers in some instances, by selling minority stakes in operational projects as a form of financing. Having assumed all the initial development risk, stakes in mature projects are then sold to low risk investors such as pension funds. The cash inflow permits them to fund new expansion opportunities, and repay debt.

Indeed, this is planned to occur on a large scale with the new €2bn investment package provided by China Three Gorges (CTG) as a part of their landmark deal to acquire the Portuguese government's 21.35% stake in EDP, sealed in December 2011. New investments would be in asset rotation format, so that CTG would acquire 34-49% equity stakes in operational projects. As a shareholder and partner,

CTG would join forces with EDP to become worldwide leaders in renewable energy, through joint development and ownership of projects.

Past, Present and Future

Manso Neto reflected on the decisions made over the years. Contrary to market speculation, he knew that EDP's bet on renewables would pay off in the long term. Simply put, the world needs renewable energy, and governments would have to ensure this.

But the short term was another matter.

In the past, EDPR's main concerns were technical, unsure of whether wind technology would function reliably and how much would be produced. Now, along with market conditions and the company's evolution, their perception of key risks had changed. Regulatory instability and financing risks were precedent, and required more careful management. Not only had these risks become more likely, they questioned whether their impact had been underestimated, taken by the euphoria of the market and ambitious expansion targets.

Indeed, the impact of changing regulation in Poland was first priority on the agenda at that afternoon's top management meeting. It was unclear if recent amendments would be retroactive and how these issues should be negotiated to protect the expected return on certain projects. This also posed the question of whether pursuing the remaining projects still made financial sense.

Manso Neto reflected on the key learnings over the past five years, and how he would steer the company through its future challenges. The future promised renewed expansion, leveraging on EDP's partnership with CTG and harnessing their world class resources to invest in the next promising renewable technology – solar photovoltaics. Although the risks may have changed, the fundamental principles of mitigation had not. The local partner was still the most important piece of the puzzle, along with a robust and flexible deal structure. Nowadays, EDPR was moving toward 100% success fee based acquisitions; "ready-to-build" never *really* means it's ready to build.

As he extinguished his cigarette and prepared to leave for the meeting room, Manso Neto was confident in EDPR's ability internalise these learnings and meet new challenges head on.

Exhibits

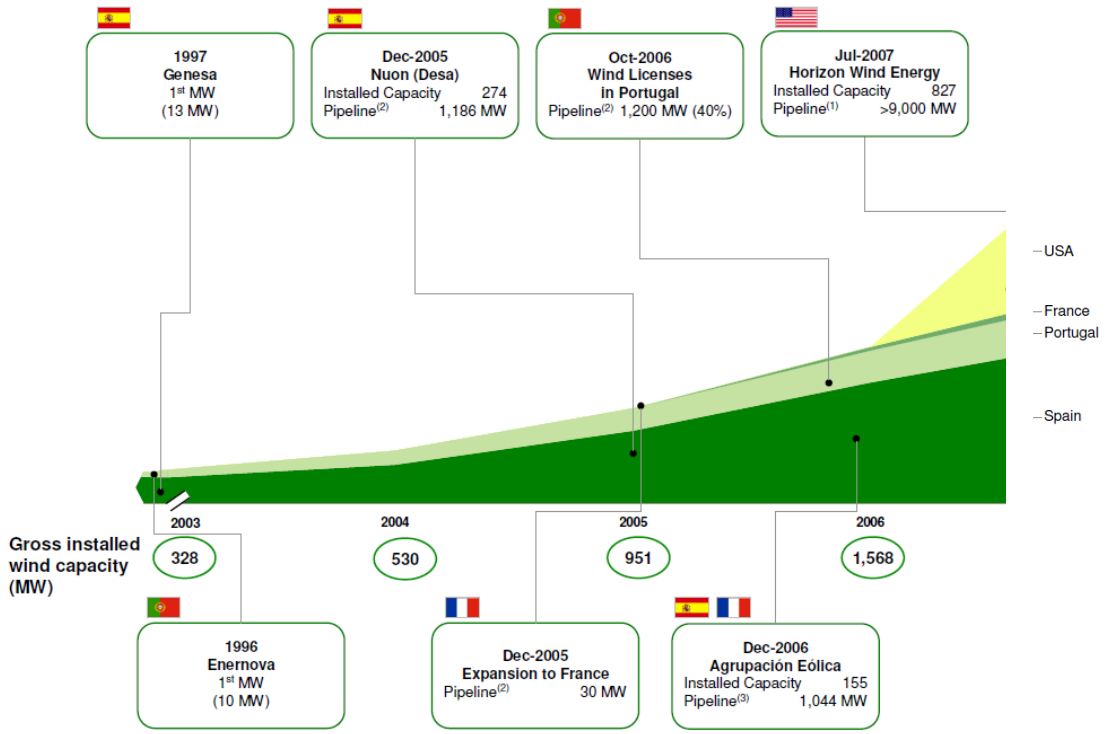
Exhibit 1: Selected Biography of EDPR's Chief Executive Officer

João Manuel Manso Neto

- CEO of EDPR since February 2012.
- Previously CEO at HC Energía, Chairman of Genesa and Member of the Board of Naturgas Energia and OMEL

2006: Member of the Board of Directors of EDP - Energias de Portugal, S.A. (re-elected in 2009).
2003-2005: EDP General Manager and Member of the Board of EDP Produção.
2002-2003: Member of the Board of Banco Português de Negócios.
1995-2002: General Manager of Financial Management, General Manager of Large Corporates and Institutional Businesses, General Manager of the Treasury, member of the Board of Directors of BCP Banco de Investimento and Vice-Chairman of BIG Bank Gdansk in Poland.

Exhibit 2: Evolution of EDPR's Global Installed Capacity, 2007



Source (10)

Exhibit 3: Status Quo in March 2007: EDPR's Global Operations.

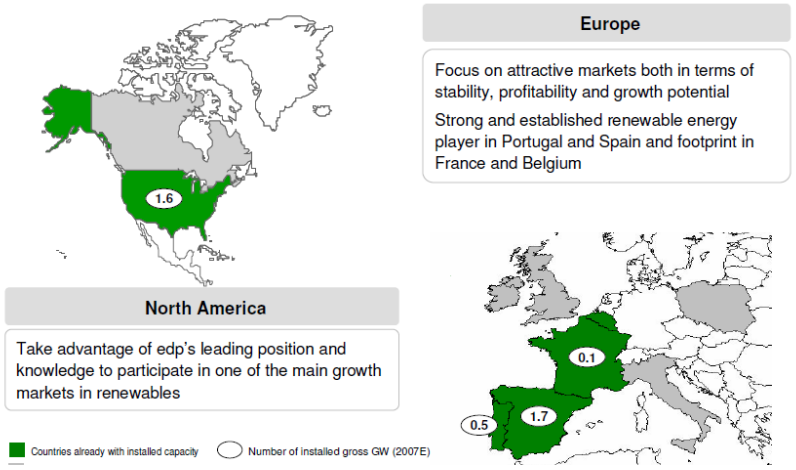
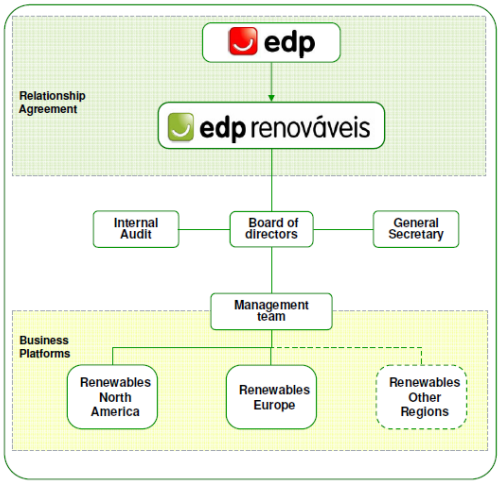


Exhibit 4: EDPR's Structure, 2007



Source: (12)&(10)

Exhibit 5: The Wind Farm Pipeline, based on EDPR's experience in Spain and Portugal

		Permitting Requirements	Probability of reaching Market	Time to Market
Installed Capacity Under Construction			~90-100%	At market
The Pipeline*	Tier 1 (Ready to Build)	• Council license received • Environmental authorization • Land agreements: >90% Grid connection secured	~90-100%	<18 months
	Tier 2	• Environmental authorization in progress • Land agreements: 50%– 90% Confirmatory interconnection study completed	~50%	
	Tier 3	• Land agreements: 10%– 90% • Preliminary design completed • Metrological towers erected or wind measurement extrapolation study completed	~25%	> 36 months
Prospects		• Very early stage, fostering growth options • Preliminary studies of site feasibility • Land agreements: 0- 10%	~15%	

*Green Field Projects = Pipeline + Prospects

Source: (2)

Exhibit 6: 2007 Projected Growth in Installed Wind Capacity, Selected Markets, 2007-15, Gross MW

Source: (10)

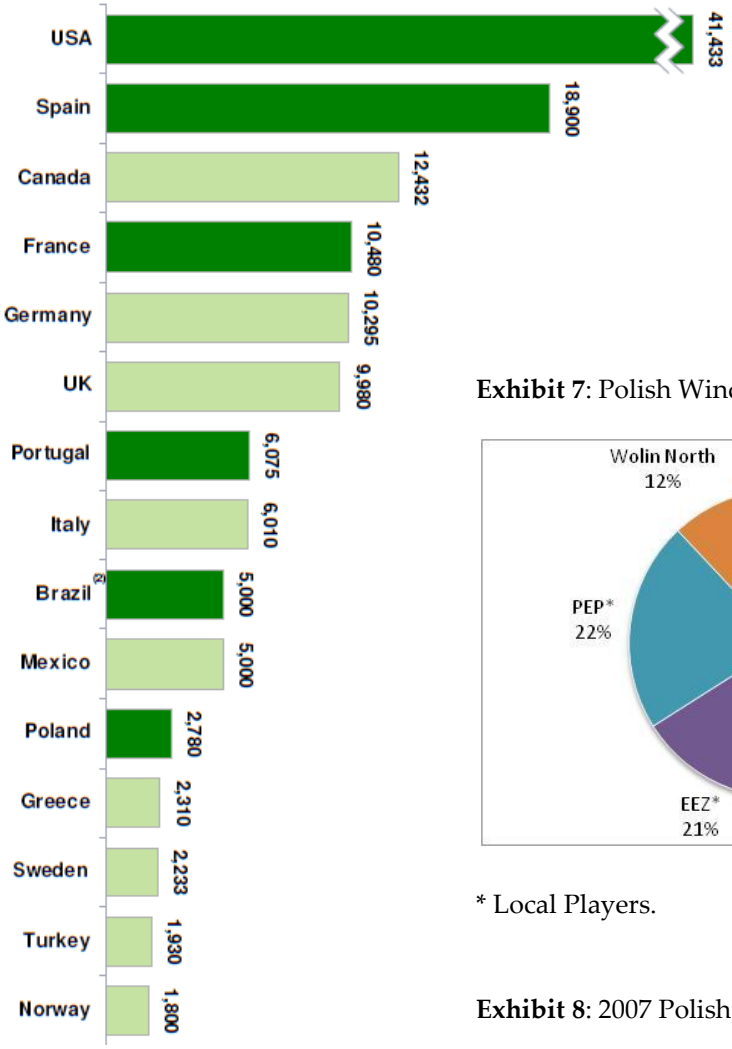
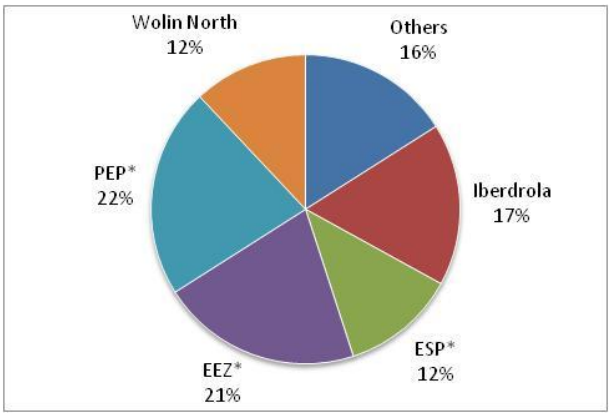
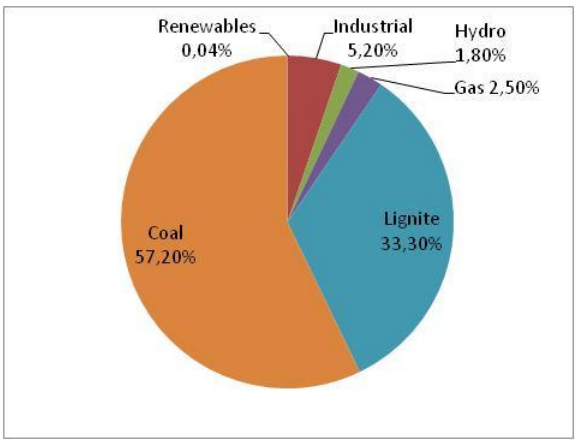


Exhibit 7: Polish Wind Market Players, 2007



* Local Players.

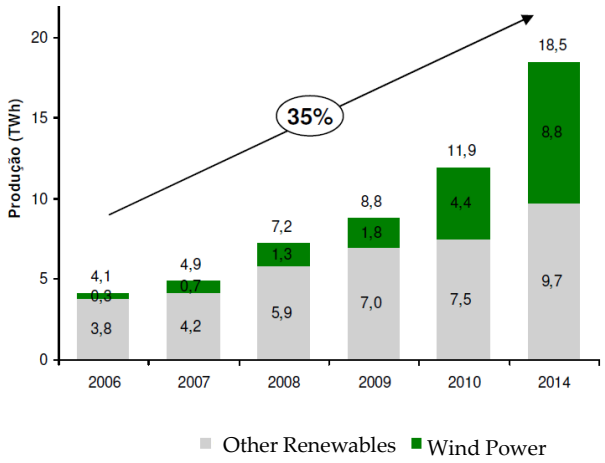
Exhibit 8: 2007 Polish Energy Mix



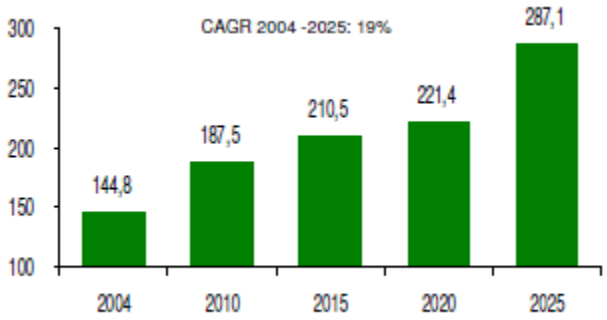
Source: (13)

Exhibit 9: : EDPR's 2007 estimates of Polish Electricity Market Growth

Renewable Energy Production



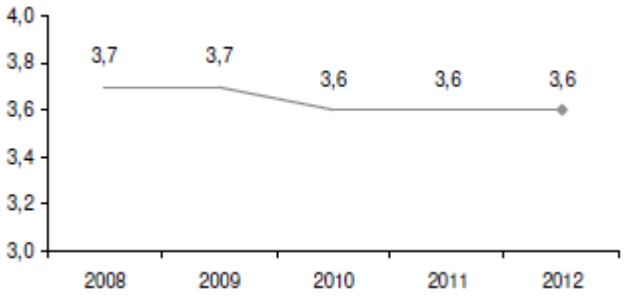
Total Energy Consumption (TWh)



Source: (13)

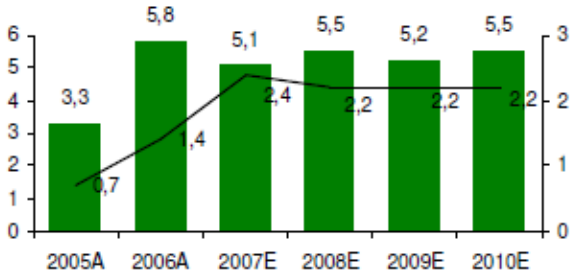
Exhibit 10: EDPR's 2007 estimates of Polish Macroeconomic Indicators

EUR/PLN Exchange Rate



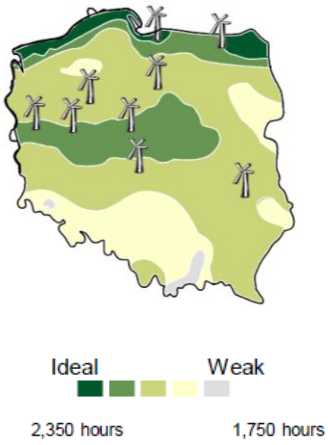
Source: (13)

Indicators



LHS: Real GDP Growth %; RHS: Inflation

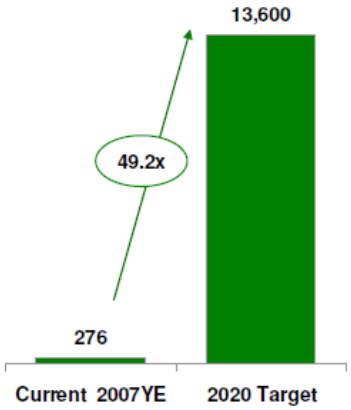
Exhibit 11: 2007 Wind Resource Map of Poland, and Relax Wind Project Locations



- Poland presents relatively good wind conditions
- Wind conditions make northern regions of Poland particularly suitable for wind farms, although saturated
- Due to aging grid and significant increase in projected demand there is a need to reinforce and develop the grid to cover increasing growth
- New energy Law in place envisages solid regulatory support and stimulates grid upgrade and expansion by strong developers and network distributors

Source: (13) and (10)

Exhibit 12: Poland National Wind Capacity Targets in 2007

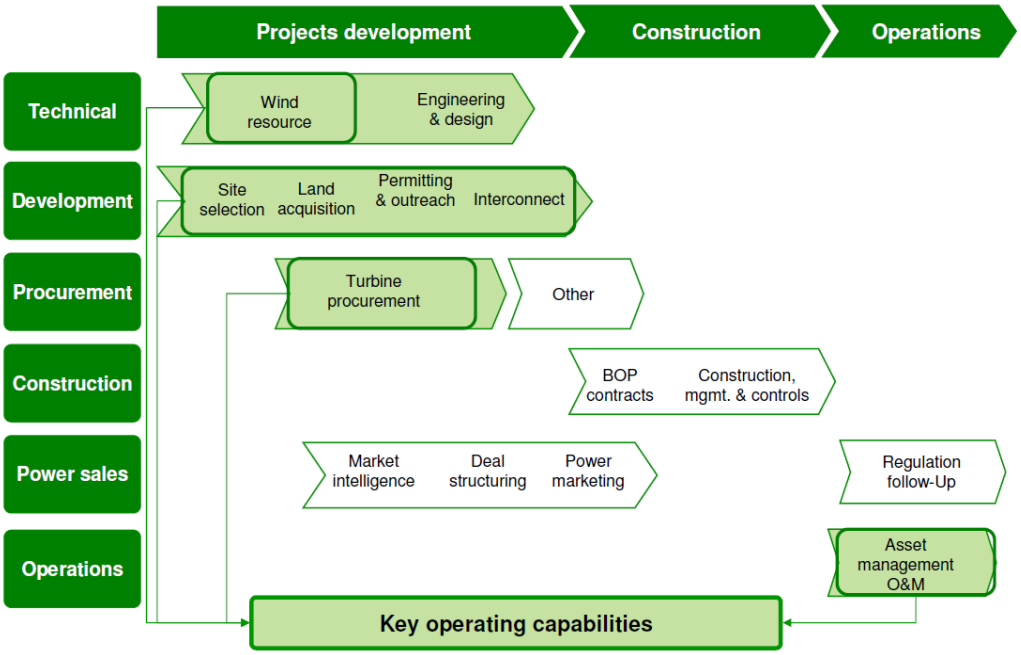


Source: (10)

Exhibit 13: Quota of energy required to be sourced from renewable sources in Poland, in 2007

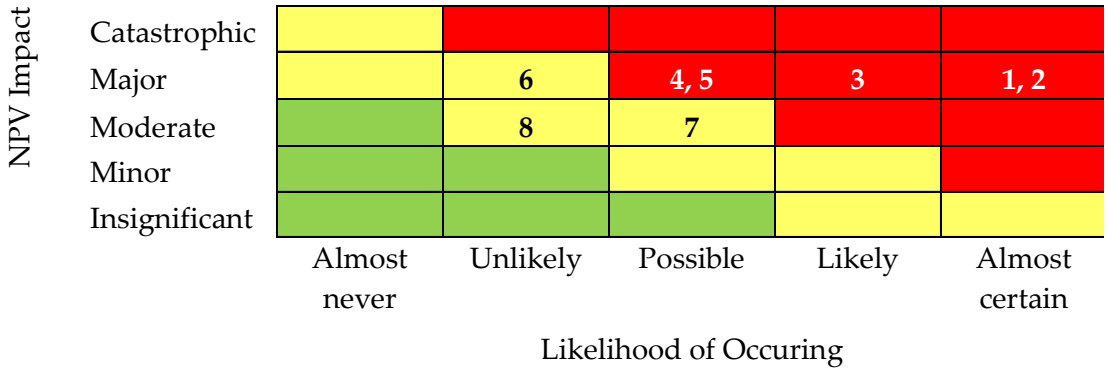
Source: (13)

Exhibit 14: Wind Farm Value Chain& EDPR Capabilities



Source: (10)

Exhibit 15: Business Development Risk Map, RWP 2007



Type of Risk: (1) Technical (2) Market (3) Pipeline Delivery (4) Turbine Capex (5) Turbine Procurement (6) Regulatory (7) Financing (8) Country. Source: (14).

Exhibit 16: Relax Wind Parks: Selected Operational Data, RWP management's estimates

Relax Wind Park Technical Data	Units	Block 1	Block 2	Block 3	Block 4
Installed Capacity	MW	120,0	430,0	276,0	196,0
Load Factor	%	30%	30%	30%	30%
Year of entry in Operation		2009	2011	2013	2015
Pipeline Classification		Tier 1	Tier 2	Tier 3	Prospects

Source: (14)

Cost Structures

CAPEX*	Units	Cost**
Turbine Contracts 2007	Mln EUR/MW	1,30
Plant Balance Costs (PLN /MW)	Mln PLN/MW	1,40
Development Costs (PLN /MW)	Mln PLN/MW	0,094
Expected Annual Capex Reduction 2007-15	%	4,00%
OPEX	**Units**	**Cost****
Variable O&M	PLN/MWh	56
Fixed O&M	PLN/MWh	12
Polish Tax Rate	%	19%
Salvage Value	%	15%

**The timeline for investment was 30% 2 years prior to operation date, and 70% 1 year prior*

** All costs are in 2007 prices

Working Capital Requirement Assumptions	
Receivables, % of Revenues	13%
Investment Payables, % of CAPEX	17%
Payables, % of Revenues	8%

Source: (15)

Estimated Energy Generation Block 1 RWP

	Units	2007	2008	2009	...	2033
Year hours	hours	8760	8760	8760	8760	8760
Load Factor	%	0	0	30%	30%	30%
Production Hours	hours	0	0	2628	2628	2628
Installed Capacity	MW	0	0	120	120	120
Energy Production	MWh	0	0	315360	315360	315360

Source: (14)

Exhibit 17: Selected Polish Macroeconomic Data, 2007 Estimates

Polish Day after Energy Market Prices, YE Average		
Year	Brown Power PLN/MWh	Green Certificate PLN/MWh
2006	118,36	243,36
2007E	117,67	239,14
2008E	144,58	247,55
2009E	158,14	244,87
2010E	172,58	241,66
2011E	178,47	239,28
2012E	194,25	217,89
2013E	208,36	185,25
2014E	210,53	165,44
2015E	212,5	154,77
2016E	211,59	151,47
2017E	212	149,68
2018E	212,3	146,25
2019E	213,54	143,87
2020E	214,87	141,25

Indicators	2002	2003	2004	2005	2006	2007
Poland Harmonised Index of Consumer Prices, (Dec-Dec, %)	0,75%	1,60%	4,41%	0,81%	1,40%	4,23%
European Harmonised Index of Consumer Prices, Dec-Dec %)	2,27%	2,05%	2,35%	2,30%	1,91%	3,08%
Exchange Rate EUR/PLN	4,02	4,69	4,06	3,85	3,84	3,60
PPP Exchange rate	-	4,04	4,60	4,12	3,86	3,79
Devaition from PPP	-	-13,9%	13,3%	7,2%	0,7%	5,4%

Source: (15)

Exhibit 18: Eurozone Money Market Rates, 2007

Eurozone Interest Rates (EUR)				
Type/Maturity	**1 January 2007**	**1 April 2007**	**1 July 2007**	**01 Sept 2007**
Euribor 12 months	4,03%	4,18%	4,53%	4,78%
Euro Swap 1 year	4,08%	4,25%	4,60%	4,70%
Euro Swap 5 year	4,13%	4,24%	4,77%	4,54%
Euro Swap 10 year	4,20%	4,31%	4,85%	4,65%
Euro Swap 20 year	4,31%	4,46%	4,98%	4,81%
Euro Benchmark* 1 year	3,88%	4,07%	4,43%	4,11%
Euro Benchmark 5 year	3,93%	4,03%	4,54%	4,15%
Euro Benchmark 10 year	3,96%	4,09%	4,59%	4,30%
Euro Benchmark 20 year	4,09%	4,26%	4,73%	4,57%

** Indicies tracking bond rates for benchmark government (Germany, France and Netherlands)*

Source: (14)

Euro Industrial Corporate Bonds Rates, 1 September 2007

	S&P Rating				
Maturity	**A**	**BBB+**	**BBB**	**BBB-**	**BB**
1 year	4,17%	4,72%	4,76%	4,86%	5,21%
5 years	4,68%	4,90%	5,06%	5,12%	5,84%
10 years	4,97%	5,29%	5,41%	5,60%	6,64%
20 years	5,32%	5,74%	N.A.	6,57%	7,77%

Source: (16)

Exhibit19: Polish Sovereign Bond Rates, 2007

Type/Maturity	**1 January 2007**	**1 April 2007**	**1 July 2007**	**01 Sept 2007**
1 year rate	4,28%	4,53%	4,92%	4,94%
5 year rate	4,99%	5,02%	5,54%	5,71%
10 year rate	5,22%	5,21%	5,64%	5,79%
20 year rate	5,31%	N.A.	N.A.	N.A.

Source: (15)

Exhibit 20: EDPR Peer Comparison, 2007 (Note: due to a lack of comparable EDPR peers operating solely in the renewable energy sector in Europe, generalist energy players are considered below)

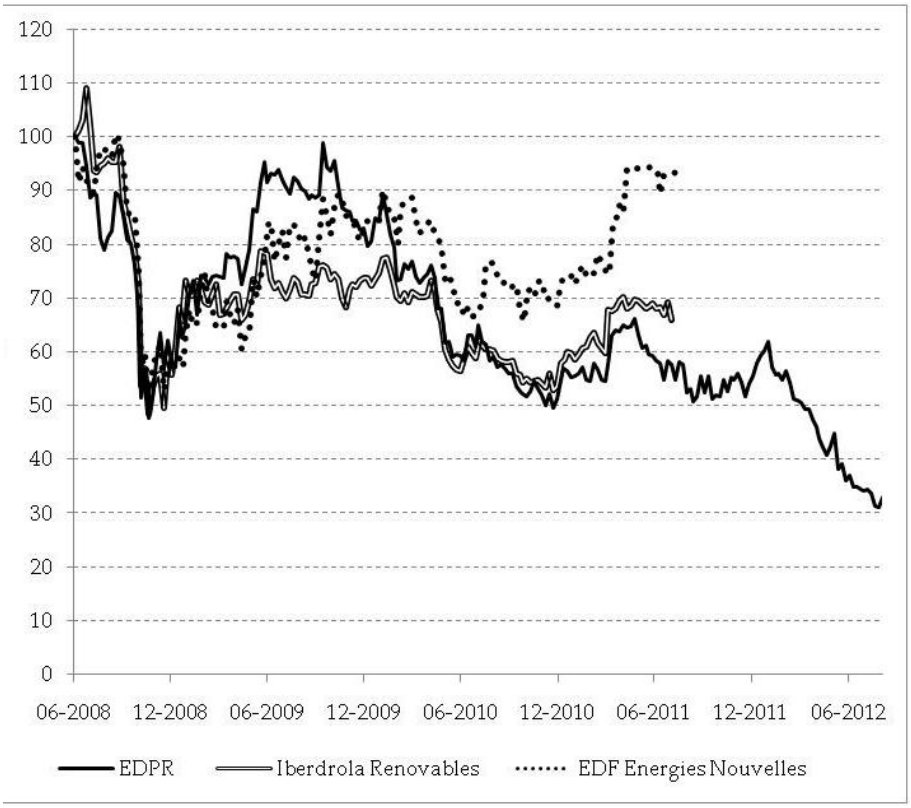
Peer Name	Mkt Cap (Bln EUR)	D/E	5 yr Raw Beta*	3 yr Raw Beta*	1 yr Raw Beta*	S&P Rating	Effective Tax Rate
EDP Renovaveis S.a.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
EDP Energias De Portugal	14,01	155,37%	0,87	0,87	0,71	A-	20,52%
Endesa S.a.	37,94	138,69%	1,21	1,37	1,07	A-	21,18%
Iberdrola S.a.	29,86	134,76%	0,67	1,26	1,6	A-	32,98%
E.On AG	68,27	26,29%	0,64	0,85	1,27	N.A.	N.A.
Acciona S.a.	8,78	238,29%	0,83	1,46	1,67	N.A.	20,96%
Gas Natural SDG S.a.	N.A.	N.A.	0,95	0,99	1,32	A	24,53%
Enel Green Power	N.A.	N.A.	N.A.	N.A.	N.A.	A-	N.A.
Fersa Energias Renovables	N.A.	N.A.	N.A.	N.A.	1,26	N.A.	18,57%
Martifer SGPS S.a.	N.A.	190,40%	N.A.	N.A.	N.A.	N.A.	23,97%

*Based on Monthly Data

Source: (15)

The 2012 Market Outlook

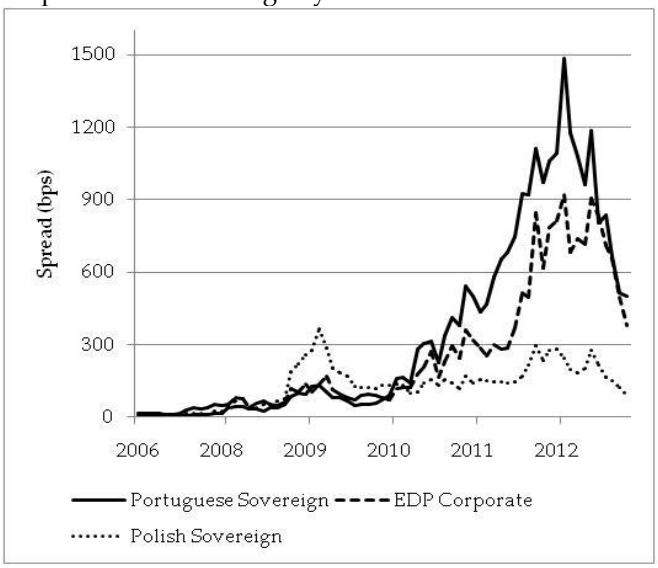
Exhibit 21: Indicies of Share Prices EDPR Peers, 2008-2012



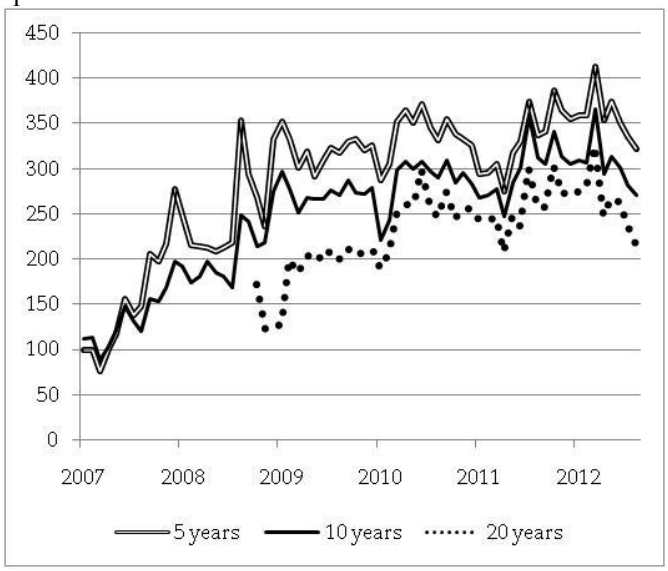
(June 2008 = 100). Source: (15)

Exhibit 22: Evolution of Money Market Rates

Corporate and Sovereign 5yr CDS



Spread Eurosbenchmark to LT Polish Bonds



Source: (15)

Exhibit 23: Selected Interest Rates, 2008-2012

Type/Maturity	YE2008	YE 2009	YE2010	January 2012	October 2012
Euribor 12 months	3,05%	1,25%	1,51%	1,95%	0,62%
Euro Swap 1 year	2,55%	1,31%	1,31%	1,41%	0,40%
Euro Swap 5 year	3,25%	2,81%	2,49%	1,72%	0,96%
Euro Swap 10 year	3,74%	3,58%	3,32%	2,38%	1,77%
Euro Swap 20 year	3,88%	4,06%	3,70%	2,69%	2,31%
Euro Benchmark* 1 year	1,76%	0,86%	0,64%	0,18%	0,04%
Euro Benchmark 5 year	2,59%	2,59%	2,14%	1,45%	0,85%
Euro Benchmark 10 year	3,24%	3,52%	3,20%	2,47%	1,86%
Euro Benchmark 20 year	3,87%	4,25%	3,69%	2,98%	2,56%

** Indicies tracking bond rates for benchmark government (Germany, France and Netherlands)*

Polish Government Bonds (PLN)

Type/Maturity	YE2008	YE 2009	YE2010	January 2012	October 2012
1 year rate	5,43%	4,18%	3,28%	N.A.	3,89%
5 year rate	5,26%	5,96%	5,52%	5,25%	N.A.
10 year rate	5,39%	6,26%	6,06%	5,89%	4,58%
20 year rate	5,60%	6,32%	6,14%	6,03%	4,74%

Source: (15)

Exhibit 24: Euro Industrial Corporate Bond Rates, January 2012

	S&P Rating				
Maturity	**A**	**BBB+**	**BBB**	**BBB-**	**BB**
1 year	1,39%	1,76%	2,04%	3,09%	3,70%
5 years	2,38%	3,44%	3,98%	4,73%	4,59%
10 years	3,82%	4,30%	4,42%	5,66%	7,88%
20 years	4,70%	5,03%	N.A.	N.A.	N.A.

Source: (16)

Exhibit 25: Evolution of EDP'S Credit Rating, 2007-2012

	Dec 07	**Dec 08**	**Dec 09**	**Dec 10**	**Jun. 11**	**Dec 11**	**Mar. 12**
S&P	A-	A-	A-	A-	BBB	BBB	BB+
Moody	A2	A2	A3	A3	Baa1	Baa3	Ba1

Source: (15)

Exhibit 26: EDPR Peer Comparison, 2012

Peer Name	**Mkt Cap (Bln EUR)**	**D/E**	**4 yr Raw Beta***	**3 yr Raw Beta***	**1 yr Raw Beta***	**S&P Rating**	**Effective Tax Rate**
EDP Renovaveis S.a.	2,36	74,45%	0,98	0,76	0,97	N.A.	23,63%
EDP Energias De Portugal	6,76	176,37%	0,83	1,04	1,05	BB+	16,35%
Endesa S.a.	14,65	50,81%	0,85	0,88	0,78	BBB+	27,73%
Iberdrola S.a.	21,66	99,23%	1,09	1,13	1,21	BBB+	15,90%
E.On AG	32,27	79,19%	1,03	0,97	0,66	A-	N.A.
Acciona S.a.	2,7	171,76%	1	1,01	0,92	N.A.	24,11%
Gas Natural SDG S.a.	10,02	143,27%	0,76	0,71	0,88	BBB	24,53%
Enel Green Power	6,24	72,02%	N.A.	N.A.	0,86	BBB+	35,43%
Fersa Energias Renovables	N.A.	N.A.	0,91	0,8	0,86	N.A.	N.A.
Martifer SGPS S.a.	63,56	152,12%	1,17	0,78	0,88	N.A.	N.A.

*Based on Monthly Data

Source: (15)

End Notes

[i] Plant Balance is the term given to all the infrastructural components of a wind project with the exception of the wind turbine (15).

[ii]The cost of life extension for a Polish Wind Farm was estimated at PLN 70,000 MW/yr, expensed on the final year of turbines' original useful life.

[iii]Meaning that the total tariff/MWh was equal to the sum of brown power and green certificates remuneration.

[iv] The top management team was composed of Radek Nowak, who had developed the first wind farm to obtain project finance in Poland, a veteran of infrastructure development in Poland and founder of EC Energy. Other members had a strong background in acquisition and development of power projects, and investment banking in the Polish utilities sector.

[v] The PPP exchange rate (ER) assumes that ERs depend only upon the inflation differential between the two currency regions. If E(ie) and E(ip) are the expected inflation rates in the Euro and in Poland, and FX_0 is the exchange rate today, the expected PPP Exchange rate is: $E(FX_1) = (FX_0)*(1+E(ie)/1+E(ip))$.

[vi] Using PPP theory, and converting EUR rates in PLN by using inflation differentials. PLN Rf = [(1+EUR Rate)*(1+EUR Infl)]/(1+PLN Infl)-1

[vii] Fluvio Conti, President of Euroelectric, October 2012

Bibliography

1. **Emerging Energy Resarch LLC.***Global Wind Energy Markets – Market Forecasts 2007-2015.* Novembro de 2007.

2. **Energias de Portugal S.A.***Dia do Investidor - Parte 1.* Lisbon : s.n., Janeiro 2008. pp. 1-32.

3. **American Wind Energy Association.***Annual Rankings Report.* April 2008.

4. **International Energy Agency.***World Energy Outlook 2007.* 2007.

5. **Association, European Wind Energy.***The Economics of Wind Energy.* March 2009. pp. 1-156.

6. **EDP Renováveis S.A.***Annual Report 2008 - Corporate Governance Report.* Oviedo, Spain : s.n., 2009. pp. 1-72.

7. **Energy, Portuguese Government - Secretary of State for.***Rents in the electricity generation sector-Report within the scope of Measure 5.15 of the 2nd update of the MoU on specific economic policy conditionality.* January 2012. p. 148.

8. **Ernst & Young.***Renewable Energy Country Attractiveness Indices - Issue 29.* London : s.n., May 2011. pp. 1-39.

9. —. *Renewable Energy Country Attractivness Indicies - Issue 33.* London : s.n., May 2012. pp. 1-44.

10. **EDP Renováveis S.A.***Company Presentation YE2007.* Oviedo, Spain : s.n., 2007. pp. 1-186.

11. **Energias de Portugal S.A.***EDP Business Plan 2007-2010 - Consolidated Financials.* Lisbon, Portugal : s.n., January 2007. pp. 1-5.

12. —. *Acquisition of Horizon Wind Energy.* Lisbon, Portugal : s.n., March 2007. pp. 1-36.

13. —. *Compra de Relax Wind Parks.* Lisbon, Portugal : s.n., December 2007. pp. 1-9.

14. Case writer's assumptions.

15. Introduction. *Balance of Plant for Wind Projects.* [Online] [Cited: November 13, 2012.] http://www.esru.strath.ac.uk/EandE/Web_sites/11-12/Wind_BOP/.

16. **Bloomberg Fair Value Curve.**

17. **TPA Horwath & Polish Wind Energy Association.***Wind Energy In Poland 2011.* Warsaw : s.n., 2011. pp. 1-76.

18. **EDP Renováveis S.A.***Unaudited Condensed Consolidated Financial Statements*30 June 20081-34

19. **Energias de Portugal S.A.***Relatório e Contas 2006 - Caderno Institucional e do Governo da Sociedade.* Lisbon, Portugal : s.n., 2006. pp. 1-179.

20. —. *EDP Strategy Review: Commitment to value creation.* London, UK : s.n., July 2006. pp. 1-33.

21. —. *Dia do Investidor - Parte 2.* Lisbon : s.n., Janeiro 2008. pp. 1-24.

22. *EDP Strategic Review: Commitment to Value creation.* **Energias de Portugal S.A.** London : s.n., July 2006. pp. 1-33.

23. **EDP Renováveis S.A.***EDP Renováveis IPO Prospectus.* Oviedo, Spain : s.n., May 2008. pp. 1-574.

24. **Bloomberg New Energy Finance.***WVAL: Wind Farm Valuation Tool.*

25. **EDP Renováveis.***Roadshow Presentation.* December 2008. pp. 1-47.

26. **Ernst & Young.***Renewable Energy Country Attractivness Indicies - Issue 32.* London : s.n., February 2012. pp. 1-36.

TEACHING NOTE

Risk and Return: The International Expansion of EDP Renováveis

Summary of Teaching Objectives

The objective of the case is to describe and analyse EDPR's business development process, using the example of their entry into the Polish market in 2007, which characterised the company's aggressive expansion period. The profitability criteria and risk mitigation strategies, such as portfolio diversification, are explained. Students are asked to evaluate the market and the investment proposal, and determine the project value taking into account the relevant risks. Subsequently, the focus is on deal structure and pricing, aiming to minimize future risk.

The second part of the case presents the 2012 scenario with substantially different market conditions, in particular frozen credit markets and heightened regulatory risk. Students are asked to analyse the impact of changing regulation on the value of the operational Polish projects, and determine how to negotiate profitability neutral solutions. Next, one questions whether exercising the option of building the remaining projects is still worthwhile, accounting for changes in cost of capital. Finally, the overall risk management procedure is evaluated in retrospect, questioning what EDPR has learnt from its expansion experience over these years.

Suggested Questions

The 2007 Outlook

1. Was Poland an attractive target market for EDPR in 2007? (Use Exhibits 6 -13)
2. What risks are diversified by entering this market?
3. Using only the data available from 2007 (Exhibits 16-20), determine the value of this portfolio accounting for key risks, in particular those not within EDPR's span of control. How should we account for multi-currency cash flows and currency risk? Should they go ahead with the acquisition of RWP? At what price?
4. During negotiations, the financial players who are stakeholders in RWP disagree on key assumptions EDPR's has made. How would you structure a deal to appease these shareholders and produce the correct incentives with local partners?

The 2012 Outlook

5. Assume that EDPR purchased RWP in 2007. In 2012, PIGEO (the Polish Economic Chamber of Renewable Energy) is in negotiations with the Polish Government over the proposed December 2011 amendments to the renewable energy act. If these amendments are approved, they may have a retroactive scope affecting already operational projects.

   If the amendments are retroactive, by how many years would Block 1&2's license period have to be extended, in order to remain profitability neutral? (Bear in mind the lifespan limit for wind turbines is 30 years). Is this enough? What else would you recommend?

6. Calculate the 2012 cost of capital for RWP. How has this evolved since 2007?
7. Should we use a country risk premium in the cost of capital?
8. How will asset rotation impact EDP's financial leverage ratio?
9. Should EDPR decide to go ahead with the remaining Block 4 if the amendments go through? If they do not, was the 2007 investment in RWP still worthwhile?
10. What would the risk heat map look like in 2012, and what are the key learnings?
11. In retrospect, were the risk mitigation strategies adequate?

Suggested Answers

Although these are the author's suggestions, there may be other valid approaches.

1. Was Poland an attractive target market for EDPR in 2007? (Use Exhibits 6 -13)

The answer to this question should refer to the criteria set out in the text to identify attractive markets:

1. **Market Size and Growth:** EDPR sought fragmented markets with high growth potential, in which they could feasibly capture 20-25%. In order to support a local EDPR team, this share should allow EDPR to install at least 100-150MW of wind power capacity per year.
2. **Regulatory Support Scheme:** as a capital intensive industry, a stable and favourable remuneration mechanism is critical for investor confidence.
3. **Country Risk:** Politically stable, with good business conditions, as well as stable macroeconomic indicators (inflation and exchange rates).

Referring to the first criteria, the Polish economic indicators in the Case Exhibits were all positive. GDP growth was expected to be between 5,1%-5,5% per year until 2010. Since economic growth creates increased demand for energy, it is unsurprising that energy demand is forecasted to practically double between 2004 and 2020. (In retrospect, although growth may not have been this aggressive, Poland has been an important source of continued growth in a crisis ridden Europe.) This key point reveals that there was space for a new energy providers in the Poland, unlike in saturated western European markets.

The next step is to determine whether the market is large enough. The first criteria implies that the market must grow between 400-750 MW per year before saturation. Since installed wind energy capacity was expected to increase by approximately 13,000 MW by 2020 - over 1000 MW per year – this requirement is met. Therefore, the RWP deal with duration of 8 years to full implementation would have to size between 800-1200 MW, as it does at 1022 MW.

It is important to refer to the competitive landscape and question whether a market share of 20-25% is feasible. Bearing in mind that the market is still expected to grow tremendously, the current market structure is unlikely to be indicative of the future; competitors now have a large portion of a small pie. Nonetheless, the majority (55%) of players were local, and the real threat came from EDPR's

European level competitors. Iberdrola and Wolin North had a 29% market share and a similar scale and business model as EDPR. Since the competitor's pipelines are unknown, the question of whether EDPR can feasibly capture this share will depend on finding a sufficiently large deal before setting up a permanent structure, as is the case of RWP.

Addressing the 2nd criteria, note that the stimulus for the wind market growth was the adoption of binding targets by the Polish government to source 15% of its energy from renewables by 2020. Given that the 2007 energy mix was comprised of 57.02% coal and only 1.84% renewables, very attractive incentives would need to be adopted to attract sufficient investment. As confirmed by Case Exhibit 13, the government imposed aggressive yearly quotas of renewable energy to be sourced by distributors, ensuring demand for renewable energy grew year on year, from 5.1% to 10.4% between 2007 and 2014.

Another encouraging factor was that both the brown power and green certificate prices were expected to be relatively high. The former because of the structurally high energy costs caused by carbon emission penalties, lack of national fossil fuel reserves, and low hydro power development. Further, forecasts predicted that renewable energy undersupply would persist at least until 2020, sustaining the price of green certificates equal to the penalty value (the substitution fee) until then.

Addressing the 3rd criteria, Poland became a member of the European Union in 2004 being obliged to promote a stable, democratic and fair government, as well as a working market economy capable of competing with peer EU markets. As evidence, the team expected inflation to stabilise at 2.2% and the exchange rate at 3.6 PLN/EUR, alongside the stable and high economic growth of 5% per year between 2007-2014.

In sum, by fulfilling all three criteria according to the Case Exhibits, Poland was an attractive opportunity for EDPR in 2007.

2. What risks are diversified by entering this market?

The risk which are most diversified by entering the Polish market are those least correlated with those of existing EDPR markets.

Firstly, the least correlated and most diversified are the technical and pipeline delivery risks. Since the climate in Poland is distinct from any other EDPR market production risk can be diversified. Pipeline delivery risks, as far as overcoming local permitting and financing obstacles, are also unrelated to other markets. This is good news, since these two have a major impact on project value, and are least controllable by EDPR. This is exactly why maintaining a portfolio diversification strategy is of utmost importance – these risks are unaffected by those in other EDPR geographies.

In second place are regulatory and country risks, which are diversified to some extent by entry into Poland. In economic terms, Poland was part of the emerging Eastern European market in 2007 with high GDP growth, and represented an important diversification from EDPR's slow growth Western European (Portugal, Spain, France) geographies, benefitting also from the presence of a non-euro currency. Nonetheless, its economy and politics were still closely linked to that of the remaining EU. In terms of regulation, this lack of diversification was important initially as it provided the ambitious

2020 renewables targets, in line with the EU directive. But the disadvantage was illustrated in the text with regulatory changes coinciding in the same period as that of Portugal and Spain.

Third, completely undiversified risks were the market, financing and turbine procurement risks. Market risks because polish brown power prices vary mainly with global commodities, being extremely dependent on the brent oil price. Financing risks are undiversified because financing is performed at corporate level by EDP, and further, because the interconnection of global financial markets makes their risks systemic. Equally, turbine procurement is performed at group level and capex varies with global commodity prices. Importantly however, all these risks were controllable to some degree, through PPAs, financial hedging, and careful procurement strategies (respectively).

In conclusion, the portfolio diversification strategy is fundamental for risk management. This is because the first level of risks which are most diversifiable are the least controllable for EDPR. The remainder EDPR is able to mitigate to some degree, especially the third level of risks. Even regulatory risks can be mitigated to some degree because there are usually channels for negotiation with the government.

3. Using only the data available from 2007 (Exhibits 16-20), determine the value of this portfolio accounting for key risks, in particular those not within EDPR's span of control.

In order to determine the value of the portfolio, one begins by estimating the free cash flows for each block. Before describing the calculations however, a note on currency risk.

How should we account for multi-currency cash flows and currency risk?

When dealing with multiply currencies, it is important to project the cash flows in the most relevant currency first. In this case, the capex in EUR and the revenues and opex in PLN. Next, convert the cash flows all into the same currency as the cost of capital (PLN). This implies converting EUR into PLN using forecasted exchange rates which ordinarily is done using a forward rate.

To deal with foreign currency risk, theory explains that spot and the forward rates already price all relevant currency risk, and it is not necessary to include an additional premium (1). Since the case does not provide forward rates however, the PPP exchange rate is used instead to convert the future capex costs into PLN.

According to the purchasing power parity theorem, currencies maintain the same relative value to one another in the long run, after having accounted for the inflation differential between the two countries. This allows us to derive a formula[1] based on expected inflation rates, to estimate the exchange rates.

Students should note however, that the PPP is an imperfect substitute for forward rates in terms of risk. This is because in the short term, currencies may not remain at parity and expose the company to real exchange rate risk. PPP exchange rates may be useful long term estimates, but they do not price the risk in the same way forwards would.

[1] If E(ie) and E(ip) are the expected inflation rates in the Euro and in Poland, and FX0 is the exchange rate today, the expected PPP Exchange rate is: E(FX1) = (FX0)*(1+E(ie)/1+E(ip)).

The final results of the analysis should be presented in EUR, since this is the currency in which EDPR consolidates its financial statements.

Revenues (Exhibit 3)

Volume: Determine the volume of wind production, as per the example in Case Exhibit 16 (Estimated Energy Generation Block 1 RWP), and find the energy production per year in MWh, for each block (Exhibit 1).

Price: for all parks, the nominal price paid for the brown power and the green certificate components are determined by the year in which the block enters operation. The block 1 PPA will be signed in 2009 when brown power is 158.14 PLN, and certificates are 244.87 PLN. From then on, these prices are fixed for the duration of the 20 year project license period, evolving with inflation. The inflation rate is estimated as an arithmetic average of the Polish HICP rate during 2002-2007 (2.20%), since this is the best unbiased estimator (Exhibit 2).

Costs (Exhibit 3)

Opex: assume that the Variable and Fixed O&M costs remain stable in PLN_{2007}, and convert these into nominal values by adjusting for inflation (Polish HICP). To find the PLN opex value, simply multiply the cost per MWh by the wind volume of each block.

Capex: turbine contracts are denominated in Euros. Assume that the estimate of capex/MW decreases at 4% per year in real terms. Then adjust for inflation, in this case, the European HICP, using the average of the 02-07 inflation as the estimator (2.33%). Once the nominal euro values of turbine capex are estimated convert this into PLN. First calculate the PPP exchange rate by using the estimated inflation rates for 2008-2015 then use these to convert the turbine contract costs into PLN (Exhibit 2).

Plant Balance and Development: following the same procedure, assume the capex prices remain stable in real 2007 values. Using the Polish HICP, adjust for inflation and find the total capex costs in PLN/MW.

Cost Distribution: while OPEX costs occur for the duration of the project life in accordance with the volume of wind generated, capex is incurred in the 2 years preceding the beginning of operations, split 30% 2 years prior to operation, and 70% 1 year prior. These costs are multiplied by the number of MW per block.

Depreciation: Capex is depreciated evenly via a straight line method, allowing for a salvage value of 15% on the 21st year of the project.

Working Capital: Current assets and liabilities are calculated as a proportion of revenues and capex according to the assumptions provided.

Weighted Average Cost of Capital (Exhibit 4)

$$\text{WACC} = K_E \frac{E}{D+E} + K_D \frac{D}{D+E} * (1-t)$$

The objective is to calculate the nominal PLN_{2007} WACC for EDP Group's renewable operations through EDPR in Poland. Since all the financing is done at corporate level, EDP Group is the relevant investor.

Cost of Equity

$$K_e = r_f + \text{Country Risk Premium} + \beta(\text{Market Risk Premium})$$

Beta: to find the risk of EDPR's operations in Poland, average the unlevered betas of EDPR's industry peers, and relever this to EDP Group's target capital structure. As is mentioned in the Case Exhibit, the peers used are generalist companies operating in both renewable and non-renewable sectors. This is due to a lack of "pure players" in renewables comparable to EDPR in Europe in 2007 (and 2012).

To estimate the asset or unlevered beta of EDPR and its peers, use the Modigliani and Miller theory, assuming that the beta of debt is zero, and that tax shields have the same risk as debt: $\beta_L = \beta_U \left(1 + \frac{D}{E}(1-t)\right)$. Having averaged these unlevered betas, we relever the beta using the target capital structure of EDP Group.

Target Capital Structure: We are unsure how the project will be futurely financed – whether through shareholder loans or project finance, and in what proportion. Thus, it is reasonable to assume that the projects will tend to a capital structure similar to EDP Group's and its peers at the moment. This kind of capital intensive energy project typifies the investments of this industry, where a strong asset base allows for more leverage. To find the target ratio, use an average of the ratios for EDP's peers with a similar credit rating. We find that the resulting ratio (59/41) is in line with the assumption in the text that debt makes up between 60-70% of EV.

Country Risk Premium: this is the difference between the polish government bond rate, and the benchmark risk free government rate, the Euro Benchmark Rate. The Euro Benchmark is an index of highly rated European government bonds. It is the appropriate risk free rate to when calculating the country risk spread for the Polish government, instead of the Euroswap which is agreement among banks and less related to government risk.

One should prefer the maturity which most closely matches the project duration of 20yrs. However, these instruments are usually in illiquid and the rates are not available for the Polish bonds. Thus, the 10 year rates were used throughout the WACC calculation for consistency.

Since the WACC is calculated in PLN, convert the EUR rates before finding the spread. Adjust using expected inflation and the PPP condition - that exchange rates follow the differential in inflation.[2] Inflation rates are derived from an average of the inflation for 2002-07, assuming this would be the best unbiased estimator of future inflation.

Risk Free Rate: use the 10 year Euroswap to maintain a consistent maturity. Swap rates are the inter-bank yield rate for swapping fixed for floating rates, taken from A/AA rated banks. They involve only

[2] *PLN Rf = [(1+EUR Rate)*(1+EUR Infl)]/(1+PLN Infl)-1

the transaction of the net interest rate, not of any notional amount. Moreover, these are much more liquid than government bonds and offered in a greater number of maturities. As such, they are a better estimate of the risk free rate than benchmark government bonds. This was also converted into PLN as explained above.

Market Risk Premium: Assumed at 5.5%, according to Mckinsey (1) and EDP's internal assumptions.

Cost of Debt

$K_d = R_f$ + EDP's Debt Risk Premium

Risk Free Rate: 10 year Euroswap converted into PLN.

Debt Risk Premium: The risk premium was found using the Bloomberg Fair Value Curve, tracking the fair value of debt for industrial European companies according to their S&P credit rating. In 2007, EDP's credit rating was A+. An average of the A and BBB+ rates were used and the premium derived by subtracted this from the risk free rate. Finally, this was also converted into PLN.

Tax Rate: The polish tax rate of 19%.

As we see in Exhibit 4, the cost of capital is 7.103%.

Free Cash Flow

Terminal Value: This is equal to the salvage value, 15% of the original investment, adjusted for 21 years of inflation (Polish HICP).

3. Should they go ahead with the acquisition of RWP? At what price?

Project Value

In order to find the range of possible project values, it is important to consider the key risks, in particular those with the highest impact and the greatest likelihood. Referring to the risk map, some of the highest ranking risks are within EDPR's scope of control - market risk, turbine capex and procurement risk - through PPAs and a first-class procurement strategy respectively.

Thus, the most concerning risks are those with greatest impact over which EDPR has least control and experience in this unfamiliar market: technical and pipeline delivery risks. For these, the valuation of the project must serve as a risk mitigation mechanism.

The remaining risks are lower priority in terms of impact and likelihood. Regulatory changes are not directly modelled because they are considered unlikely in the 2007. Further, one can argue that regulatory risk is partially subsumed within country risk, which alongside financing risk would be modelled through the a sensistivity analysis of the WACC.

Thus, the higher priority technical and execution risks, will drive the scenario analysis. Subsequently, one questions whether the maximum WACC implied by the corporate hurdle rate of 1.4x IRR/WACC is reasonable, with a given IRR.

Scenario	Load Factor
Best	30%
Base	27.5%
Worse	25%

As EDPR is the buyer, it is reasonable to expect that they be conservative and risk averse in their estimations. This is reflected in the

fact that their best case scenario comprises the load factors estimated on their behalf by the RWP management. EDPR has stated concerns that this may be overestimated, given the seller's incentive is to do so. Since the typical range of load factors for similar EDP projects in the region fall between 25-30%[3], this is the range assumed in the scenarios. The execution rates will be considered in the next section.

Full Project Values

Begin with assuming that all the blocks are executed with 100% success rate, to determine the impact of the load factor alterations and the WACC. The execution rates shall be analysed next to determine the price and negotiation strategy.

	Best Case			Base Case			Worst Case		
Block	**NPV (Mln PLN)**	**IRR**	**IRR/ WACC**	**NPV (Mln PLN)**	**IRR**	**IRR/ WACC**	**NPV (Mln PLN)**	**IRR**	**IRR/ WACC**
Block 1	378,25	12,57%	1,77	296,80	11,46%	1,61	215,36	10,32%	1,45
Block 2	1.319,22	13,25%	1,87	1.055,92	12,10%	1,70	792,62	10,92%	1,54
Block 3	618,51	12,42%	1,75	482,97	11,32%	1,59	347,42	10,19%	1,43
Block 4	304,25	11,50%	1,62	228,26	10,46%	1,47	152,27	9,38%	1,32
Average		12,44%	**1,75**		11,34%	**1,60**		10,20%	**1,44**
Total RWP Value	2.620,24			2.063,95			1.507,67		

The first point is that under all scenarios, the corporate hurdle rate of 1.4x IRR/WACC for the portfolio average (i.e. all 4 blocks) is met, although the worst case scenario comes quite close to this, with some blocks falling under the hurdle. Note that the hurdle is quite high on its own, and requiring that the average be 1.4x ensures substantial value creation and provides a significant buffer against value destruction.

The second point is to evaluated the cost of capital in 2007 of 7.103%. This is at the lower end of the typical range of EDP WACCs, between 6.5-9% (250bps). Firstly, consider what the maximum positive deviation in the WACC would be in order to maintain the average portfolio return above the hurdle rate. Second, taking into account that the range of EDP WACCs, calculate what magintude this deviation represents, in proportion to the range:

Indicator	**Best**	**Base**	**Worse**
Max WACC to maintain hurdle	8.88%	8.10%	7.29%
Deviation from $WACC_{2007}$(bps)	178	99	18
Magnitude of Deviation (% 250 bps)	71.15%	39.73%	7.37%

[3] EDPR's Website: http://www.edprenovaveis.com/OurMarket

Note that on one hand the maximum possible WACCs are more toward the middle of the range than the current WACC, but that the magnitude of the deviation is significant enough to be unlikely in the base and worse case scenarios. Additionally, it is important to emphasise that the hurdle rate is a buffer, which even when reached ensures a very high profitability for the projects.

On a hypothetical basis, *if* the blocks were completed 100% successfully, they would be valuable investments.

Acquisition Price

Nonetheless, because it is known for a fact that only a minority of the parks will reach the operational phase (even in the best case, only 41% of the MW will be implemented!), the previous values do not reflect the true value of RWP. The true value must be adjusted for the actual execution rates of the blocks. For each of the scenarios considered above, consider a range of possible execution rates.

The execution probability rates given in the Case Exhibit 5 are based on EDP's experience in Spain and Portugal. It is reasonable to suggest these rates are overestimated for the Polish market. Not only does EDP know the latter markets very well, their bargaining power with authorities is high, reducing permitting barriers (particulary in Portugal). Moreover, given the maturity of the wind sector in these countries, it has the advantage of having more stable market conditions. For instance, the local authorities have already adapted permitting regulations for these power plants, whereas the Polish authorities are likely to still be catching up. In terms of financing partners, because this is a known technology, investors are less wary and know the appropriate return to demand for the risk.

With this in mind, the following scenarios were used:

	Execution Rate Scenarios		
Stage	Max	Intermediate	Min
Tier 1 (Block 1)	95%	80%	65%
Tier 2 (Block 2)	50%	35%	20%
Tier 3 (Block 3)	25%	10%	0%
Prospects (Block 4)	15%	0%	0%

The Maximum scenario has the rates in Exhibit 5, and subsequently drop by 15% for the intermediate and Minimum scenarios each time. Applying these probabilities, we obtain the adjusted values for RWP found in Exhibit 6.

In summary, (Mln PLN):

	Best Case	Base Case	Worst Case
Average Adjusted Value per Scenario	851,70	674,78	497,85
Proportion of Full Project Value	32,50%	32,69%	33,02%

The values range from PLN 497.85M-851.7M, and the average adjusted values are approximately 1/3 of the full values in all scenarios.

Once a range of values has been established, the next step is to determine what the current owners deserve to be compensated for in the acquisition price. Since some blocks are closer to the operational stage, the owners deserve an higher proportion of the total block value as compensation for developing the project to that stages. For the initial stage projects, EDPR is now going to be contributing significantly to the development, financing and operation of these projects, so it would not make sense to compensate current owners for this.

Compensation for current owners	
Tier 1	80%
Tier 2	50%
Tier 3	30%
Prospects	10%

The compensation rates are typically less controversial in negotiations (than for instance execution rates), since they can be based on global industry benchmarks. Accordingly, this table establishes the proportion of project value which EDPR could be willing to compensate the current owners for in the acquisition price. A significant portion of the value of Tier 1 projects will be given away since they are already in the financing stage, which is a very significant project milestone, and an indication of low risk associated to this tier.

When the execution and the compensation rates are combined, the result is a range of potential prices for ther RWP acquisition (PLN Mln):

	Best Case			Base Case			Worst Case		
Block	Max	Intermediate	**Min**	**Max**	**Intermediate**	**Min**	**Max**	Intermediate	Min
Block 1	287,47	242,08	**196,69**	**225,57**	**189,95**	**154,34**	**163,67**	137,83	111,98
Block 2	329,81	230,86	**131,92**	**263,98**	**184,79**	**105,59**	**198,16**	138,71	79,26
Block 3	46,39	18,56	**0,00**	**36,22**	**14,49**	**0,00**	**26,06**	10,42	0,00
Block 4	4,56	0,00	**0,00**	**3,42**	**0,00**	**0,00**	**2,28**	0,00	0,00
Total Price for RWP	668,23	491,50	**328,61**	**529,20**	**389,23**	**259,93**	**390,17**	286,96	191,25

Here, the zone of potential agreement (ZOPA) is highlighted as the base case scenario, plus the Max of the Worst Case and Min of the Best Case, as this is an intermediary zone.

Thus, the acquisition prices range from PLN 260-529M, approximately €72-147M.

4. During negotiations, the financial players who are stakeholders in RWP disagree on key assumptions EDPR's has made. How would you structure a deal to appease these shareholders and produce the correct incentives with local partners?

When structuring the deal and negotiating with the current RWP owners, there are several points to consider: bargaining power, EDPR's objectives, how to appease disagreements and limit overpayment risk.

Firstly, although not a partnership of equals, both partners need each other in order to build a profitable business. It is clear what each contributes: the existing pipeline and local contacts necessary to facilitate permitting and financing are RWP's contribution. EDPR brings the experience and resources to construct, finance and operate the wind farms, and will enable such projects to reach operation.

EDPR may have the upper hand due to its size and experience, but one could also argue that this hot market is a seller's market. Nonetheless, because the objective is to working together futurely, it is important to do so on good terms. This is particularly true of the management team, as opposed to the financial players who are short term stakeholders.

For this reason, a deal structured as an upfront payment plus success fee is an ideal solution, being a compromise in which both parties get their way. As we have seen above the range of prices for RWP (€72-147M) varies with the expected execution rates. EDPR's incentive is to underestimate these rates

as much as possible, and minimise the upfront payment in order to pay only for what is certain. RWP's owners would want the exact opposite.

EDPR could structure the deal so that the upfront payment would compensate only for Block 1, and the Success fee for the remainder. According to the ZOPA range of values, the prices which EDPR could propose are the following:

	PLN		EUR	
	Max	**Min**	**Max**	**Min**
Upfront Payment Block 1 (Mln)	154,34	196,69	42,87	54,64
Success Fee Blocks 2-4 (000s/MW)	117.064	336.615	32.518	93.504

In this way, both sides concede. EDPR can avoid a one off lump investment by paying now only for what will almost certainly be implemented (Block 1), and mitigate the risk of overpayment by paying for each additional MW only as it is implemented. The interval for the upfront payment is relatively narrow, between €43-55M.

However, the interval for the success fee is quite large, ranging from €33,000-94,000 per MW implemented. EDPR could concede to the higher end of this interval without risking overpayment: since the interval is created by the range of execution rates, it would be fair compensation if the MW was actually implemented. The success fee structure is also advantageous because it aligns the objectives of the RWP's owners with those of EDPR (to reach implementation) and creates a constructive mindset of "growing together".

It is also common for additional restrictions to be imposed in the success fee, such as reducing the fee if EDPR has to invest in projects which are not as advanced as promised. If a ready to build project has a delay and requires more investment (in research or planning, etc), this can detract from the success fee.

Moreover, the upfront payment may come in different formats concerning the Management's compensation. For instance, it is common for some of the management to be offered stock options in the new company to align incentives, but also, part of the upfront payment could be reserved for the management team in the form of a bonus. These are often end loaded such as an earn-out clause, or stock options with a vesting period of 3 years, to ensure a minimum time commitment from the team.

5. Assume that EDPR purchased RWP in 2007. In 2012, PIGEO (the Polish Economic Chamber of Renewable Energy) is in negotiations with the Polish Government over the Dec. 2011 amendments to the renewable energy act. If these amendments are approved, they may have a retroactive scope affecting already operational projects.

If the amendments are retroactive, by how many years would Block 1&2's license period have to be extended, in order to remain profitability neutral? (Bear in mind the lifespan limit for wind turbines is 30 years). Is this enough? What else would you recommend?

Begin by estimating the impact of the amendments on the profitability of the project, if EDPR takes no action to mitigate some of the effects by extending the licensing period. The amendments are to

reduce the period of green certificates by 5 years to 15 years in total, and the number of certificates to 0.75/MWh of energy produced, a discount of 25%.

Impact of 2012 amendments on profitability of Blocks 1&2, 20 year license period:

	Block 1			Block 2		
	2007	2012	% Change	2007	2012	% Change
NPV (Mln PLN)	378,25	105,87	-72%	1.319,22	487,74	-63%
IRR	12,57%	8,92%	-29%	13,250%	9,776%	-26%
IRR/WACC	1,77	1,26	-29%	1,87	1,38	-26%

The results above are for the best case scenario and the full project values, maintaining all else as was estimated initially (including WACC) and altering only the top line. Even in the best case scenario, the results are dramatic. NPV falls by 72% and 63% for Blocks 1& 2 respectively, and IRR by 29% and 26%. Importantly, the projects would no longer pass the hurdle rate.

The next step is to understand the mitigating effect of extending the license period of the Blocks, so that they operate for more than 20 years, while only earning 0.75 certificates per MWh for 15 years. The profitability was calculated if operation was extended to the technical maximum of 30 years. The additional capex was calculated by finding when the turbines would reach the end of their useful life, bearing in mind their 15% salvage value at the end of the 20 year license period. This occurs on the 24th year, and on this year new capex is incurred (PLN 70,000/MW/year) in order to extend the operating period for an additional 6 years.

When compared to the original full project values, under the best case scenario, these are the results:

	Block 1			Block 2		
	2007	2012	% Change	2007	2012	% Change
NPV (Mln PLN)	378,25	50,22	-87%	1.319,22	589,88	-55%
IRR	12,57%	7,84%	-38%	13,250%	10,66%	-20%
IRR/WACC	1,77	1,10	-38%	1,87	1,42	-24%

Immediately one notices that this is not a profitability neutral solution for either Block by any measure. Surprisingly, Block 1's profitability is actually worse than before, with NPV having decreased even further to 13% of the original value. The effect on Block 1 can be explained by the removal of the terminal value asset equivalent to 15% the original capex in the 20th year (PLN 171M), and an additional expense of PLN 55M in the 24th year. On the other hand, Block 2 shows an improvement from the previous calculation, and although NPV is at less than half its original value, it is above the hurdle rate (1.42x IRR/WACC).

Even if Block 1's license period were not to be extended for all 6 years, the problem still remains that this solution is extremely damaging to the original profitability. Given that the Polish government is in the wrong for "altering the rules in the middle of the game", and imposing these retroactive measures, EDPR may have some scope to negotiate even further for profit neutrality.

To avoid such a tremendous loss, EDPR must try to negotiate further concessions from the authorities, for instance, an "either or" scenario. Apart from conceding to a 30 year license period,

EDPR also negotiates either the reduction in certificate years (20 to 15 years), or the certificate discount (from 25% to 0%).

In the either or scenario, EDPR should prefer the 15 years of full value certificates to 20 years of certificates at a 25% discount, highlighted in Exhibit 7. This is due to the time value effect, whereby the NPV is much more sensitive to alterations made in the initial projects years, such as discounting the certificate value, then to alterations in later years. The discount has a larger negative effect on NPV then decreasing the number of years for which certificates are rewarded.

Nonetheless, this solution is still not NPV neutral for either project, with NPV falling by 47-62% for Block 1, and 21-34% for Block 2. Indeed, Exhibit 7 shows that in order to remain NPV neutral, Block 2's NPV can only withstand a cut of up to 4% in certificate value, or a reduction of up to 18yrs of Green certificates. Block 1 unfortunately never recovers the original NPV under these conditions.

EDPR could try to minimize the damage by demanding this profitability neutral solution for Block 2, and no alterations at all to Block 1. They must lobby through PIGEO in combination with other wind farms developers to make the government understand the extent of the damage of these retroactive amendments, not only to present project value but also to future investor confidence.

6. Calculate the 2012 cost of capital for RWP. How has this evolved since 2007?

As shown in the Exhibits 8, the cost of capital for 2012 was calculated using the same method as before, and is 7.873%. This represents an increase of 10.3% in EDP's opportunity cost for Polish investments between 2007 and 2012. This indicates the increase in business and financial risk associated with EDP's investment in Poland through EDPR, and demonstrates the significant economic changes which have occurred in this period.

Cost of Equity

The levered beta has increased by 33%, due mainly to the increase in the target capital ratio and the unlevered beta, as expected given the events of the period. EDPR's peers, particularly the ones in countries most affected by the sovereign debt crisis (Italy and Spain) have similarly seen an increase in leverage and a downgrade in credit rating, caused in part by the sovereign ceiling rule in credit rating. This explains the marked increase in the target capital structure used in the WACC.

	2007	2012	% Change
Average Unlevered Beta	0,428	0,517	21%
Effective Tax Rate	20,5%	16,4%	-20%
Target D/E*	143%	161%	13%
Levered Beta	0,914	1,212	33%

Moreover, the unlevered beta's increase is also quite significant, indicating an increase in the business risk of such European utilities. Again, this conforms with expectations. European electricity markets have been moving toward liberalisation and increased competitiveness, as demonstrated in Portugal by the reduction of fixed remuneration contracts and increased market exposure. Moreover, the utility sector as a public good has historically been closely correlated to the public sector and exposed to regulatory risk, which has increased with the sovereign debt crisis.

PLN Rates	2007	2012	% Change
10 yr Euro Benchmark	4,4283%	2,60%	-41%
10yr Euro Swap Rate	4,7782%	2,51%	-48%

However, the full impact of this increase in **business** and **financial** risk has not been reflected on the Cost of Equity

because of a simultaneous decrease in all Eurozone interest rates. As can be seen in the Case Exhibit 23, this decrease has occurred consistently between 2008 to 2012, whether considering Euribor, Euro swaps or Euro Benchmark rates. This results from the monetary stimulus policy followed by the European Central Bank, persistently cutting its key lending rates in response to the dual crises.

PLN Rates	2007	2012	% Change
Country Risk Premium	1,361%	3,29%	142%
Risk Free Rate	4,778%	2,51%	-48%
Relevered Beta	91,416%	121,25%	33%
Market Risk Premium	5,500%	5,50%	0%
Cost of Equity	**11,2%**	**12,5%**	**12%**

Thus, the net effect on the cost of equity is seen here, with a 12% increase due to the offset between rising Polish country risk and business risk, and reduced risk free rates.

The increase in the Polish country risk premium is clearly represented in Case Exhibit 22, which tracks the spread between the Euro benchmark rate and the Polish Bond between 2007 and 2012. This may be misleading however. As was shown, the benchmark rates have been decreasing dramatically, and although Poland is not isolated from the Eurozone crisis, it has demonstrated resilience - GDP growth declined slower than European peers during 2007-9 and recovered faster to 4.35% by 2011. As we see below, this measure of country risk may not be appropriate, since Poland can be considered an important source of diversification for EDPR.

Cost of Debt

PLN Rates	2007	2012	% Change
EDP Risk Premium	0,482%	3,61%	650%
Risk Free Rate	4,778%	2,51%	-48%
Total Cost of Debt	5,260%	6,12%	16%
Cost of Debt after tax	4,261%	4,96%	16%

Most notable is the dramatic increase (650%) in EDP's risk premium, which is in accordance with the four notch credit rating downgrade suffered in this period, to below investment grade (from A- to BB+). Case Exhibit 22 shows graphically how EDP's risk premium has increased in this period, in line with the marked increase in Portuguese sovereign risk, as represented by CDS rates. It must be noted however, that at 176% capital ratio, EDP is currently the most levered of its peers, and this increased financial risk has contributed substantially to the increase in EDP's risk premium.

Thus, the increase in WACC for EDP's Polish renewable investments demonstrates the increase in business and financial risk between 2007 and 2012, given high exposure to sovereign crises and increase in corporate leverage. This was masked to some extent by falling risk free rates, although the country risk premium associated with Poland may be overestimated.

7. Should we use a country risk premium (CRP) in the cost of capital?

There are two methods for accounting for the greater risks associated with emerging markets, such as greater volatility in the local capital markets, and macroeconomic and political environments. The first, supported by the Mckinsey (1) is to use a scenario analysis discounted cash flow, with at minimum two scenarios: distressed (where the impact of these adverse risks on cash flows are estimated) and business as usual. Each scenario is assigned a probability, and the value is found.

The alternative is to add a country risk premium spread to the cost of capital.

Ordinarily, the cost of capital is calculated from the perspective of a global diversified investor. In EDP's case they are not as diversified as a global investor (remaining within the Energy sector although in global geographies), but, there are some country risks related to Poland which are diversifiable (e.g. expropriation, devaluation). Mckinsey defends that these diversifiable risks should not be included in the WACC but should not be disregarded either, by modelling them in the cash flow scenarios as per the first method.

The problem with the second method is the lack of an objective method for deciding which risks should be incorporated in the WACC as a CRP and how to measure these. It is only appropriate to use the spread of the local government bonds against the top rated euro benchmark bonds (as EDP does) if the returns on local governments bonds are highly correlated with those of corporate bonds. It is important to remember that the country risks will affect different companies in different ways.

Nonetheless, given that energy companies provide a public good, and are highly exposed and dependent on regulatory intervention, one could argue that the energy sector and the government are highly correlated, especially in the case of renewables. This would be a justification of EDPR's methodology.

Ultimately it is important to realise that this methodology is controversial, and perhaps the use of scenario DCF would provide managers which a more intuitive understanding of the risk involved, whereas the discount factor approach is a black box.

As we have seen in the discussion for question 1, in many ways Poland provides an important source of diversification for EDPR, particularly during the dual crises. The Polish economy has remained a source of growth unlike the remainder of Europe, and perhaps the CRP penalises the value of projects in this country too heavily.

8. How will asset rotation impact EDP's financial leverage ratio?

Asset rotation involves the sale of minority stakes in fully developed wind farms. Because only a minority stake is sold, the full EBITDA of the farms are still consolidated at group level. However, the cash inflow from the sale of these assets permits EDP to pay off debt at a corporate level or invest in future growth opportunities. This means that the key leverage ratio, Net Debt/EBITDA, has a positive adjustment: while the numerator reduces, the denominator remains the same. Quite simply, it will allow for an improvement in this important ratio, which is key for leverage assessments and the basis of credit rating.

9. Should EDPR decide to go ahead with the remaining Block 4 if the amendments go through? If they do not, was the 2007 investment in RWP still worthwhile?

In order to decide whether to go ahead with the 4th Block or not, calculate the value of the project nowadays, given two alterations: top line remuneration (15 years of certificates at 25% discount), and the discount rate (7.803%), Exhibit 9.

	2007	2012	% Change
NPV (Mln PLN)	304,25	96,55	-68%
IRR	**11,50%**	**9,02%**	-22%
IRR/WACC	**1,62**	**1,15**	-29%

As could be expected, the value of the project has dropped significantly to substantially below the hurdle rate. EDPR should not invest in the project if in fact the amendments go through.

Nonetheless, it is safe to say that the RWP acquisition was worthwhile, despite deciding not to go ahead with these projects. This is due to the robust deal framework, where the flexible success fee structure means no money will be lost if they decide not exercise this option.

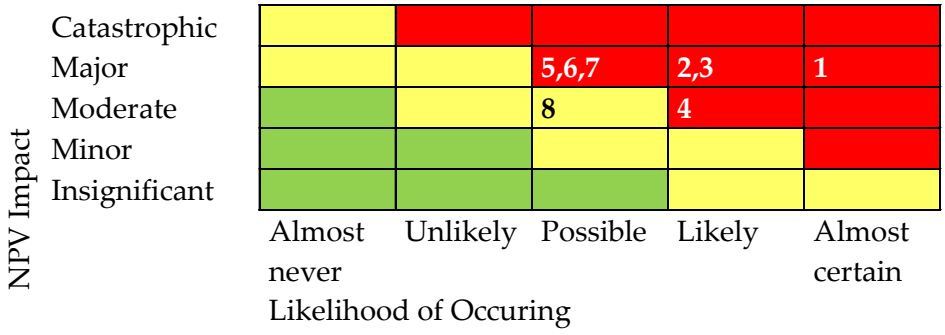
Moreover, EDPR had been aware at the time of acquisition that it was unlikely for all projects to be implemented. More important was opening the door to the Polish market and enabling future deals as their experience and confidence increased, both in Poland and in other promising Eastern European markets.

Finally, these projects provide an important source of diversification for EDPR, since ordinarily it is rare for such regulatory alterations to occur all at once. The greater concern is over Blocks 1&2, which have already been implemented, and the unknown outcome of these negotiations.

In reality, the Polish government decided not to impose such amendments, given the widespread and unanimous criticism from business, citing that the industry was not ready for cuts – the renewable overcosts were still too high. Although Governments have the right to alter regulations, in Europe they generally try to be fair, because they understand the importance of regulatory stability in promoting investor confidence. Indeed, given that the Polish government is committed to reaching the ambitious renewables targets by 2020, businesses in this field do have some bargaining power.

10. What would the risk heat map look like in 2012, and what are the key learnings?

The 2012 Risk Map:



Type of Risk: (1) Market (2) Regulatory (3) Technical (4) Financing (5) Pipeline Delivery (6) Turbine Capex (7) Turbine Procurement (8) Country.

The key learning is that the perception of risk is contextual, and it can also change with experience. The main alterations were in the likelihood of the individual risks:

Technical risk: wind farm productivity risk has reduced from almost certain to likely. As the Polish wind farm industry matures, and increasing amounts of research are produced, load factors can be predicted with greater certainty.

Pipeline Development Risk: has reduced from likely to possible. Having successfully implemented three blocks by this stage, EDPR has greater experience in managing the permitting process alongside their local partners. They will have created contacts and established a reputation in the industry, facilitating the process and increasing the likelihood of overcoming these barriers.

Regulatory Risk: increased from possible to likely. As documented in the case, the sovereign debt crisis has affected renewable energy regulation in EDPR's European markets, including Poland. Although regulatory risk in Poland was perhaps more correlated with that of EDPR's core markets than previously realised, is can be mitigated to some extent through negotiation.

Financing Risk: increased from possible to likely. Concerning project finance, the systemic nature of the financial crisis has frozen European markets generally, and further complicated the already illiquid Polish market. Further, the availability of shareholder loans has been significantly restricted by EDP's reduced credit rating.

Country Risks: increased from unlikely to possible, again in recognition of the systemic nature of the financial and Eurozone crisis, despite the fact that Poland has been shielded from this to some extent.

11. In retrospect, were the risk mitigation strategies adequate?

The combination of portfolio diversification and individual risk mitigation was a winning strategy. As shown throughout this analysis, the risks can be categorised according to their likelihood and impact, and of equal importance, according to EDPR's ability to control and mitigate them.

Market risks are eliminated through PPAs and turbine risks through robust procurement strategies. On the other hand, technical and pipeline delivery risk, although not controllable, are diversifiable through the portfolio, and reduce as experience in the market increases. The remaining risks, (regulatory, financial, and country) are to some degree diversifiable but not at all within EDPR's control. As such, the acquisition deal structure serves as the ultimate risk mitigation strategy.

Limiting the upfront payment and phasing investment ensures EDPR does not commit funds before being certain it is profitable to do so, while also creating an incentive structure which increases the likelihood of implementation. This way, the deal structure turns the development of Block 4 into an option, exercised only if conditions are favourable, and limiting risk. EDPR today has learnt to maximise this effect by making the acquisition deal 100% success fee based.

The problem arose however with the change in regulatory risk, and the potential effect of retroactive amendments on the implemented parks. While this is a risk which is always present, it is important to notice that it is to some extent negotiable. EU Governments are not unreasonable, and will listen to the industry if measures are too damaging. Moreover, changes in remuneration levels generally

follow falling overcosts, and if this is true, developers like EDPR will be able to absorb these amendments and remain profitable.

Bibliography

1. **Mickinsey & Company.** *Valuation - Measuring and Managing the Value of Companies.* New Jersey : John Wiley & Sons, Inc., 2010. pp. 1-862.

Exhibits

Exhibit 1: Exemplified calculation of Energy production (Blocks 1-4), opex and capex

	Units	2007	2008	2009	2010	2011	2012	2013	2014	2015
Volume of Energy Production										
Block 1	MWh	0	0	315.360	315.360	315.360	315.360	315.360	315.360	315.360
Block 2	MWh	0	0	0	0	1.130.040	1.130.040	1.130.040	1.130.040	1.130.040
Block 3	MWh	0	0	0	0	0	0	725.328	725.328	725.328
Block 4	MWh	0	0	0	0	0	0	0	0	515.088
Inflation Adjusted OPEX Costs										
Variable O&M	PLN/MWh	56,00	57,23	58,49	59,78	61,09	62,44	63,81	65,21	66,65
Fixed O&M	PLN/MWh	12,00	12,26	12,53	12,81	13,09	13,38	13,67	13,97	14,28
Adjusted CAPEX Costs										
Reduction in Capex (4%p.a.)	€/MW	1.300.000	1.248.000	1.196.000	1.144.000	1.092.000	1.040.000	988.000	936.000	884.000
Nominal Capex	€/MW	1.300.000	1.277.037	1.252.301	1.225.723	1.197.231	1.166.749	1.134.201	1.099.506	1.062.583
Exchange Rate Conversion	PLN/MW	4.682.080	4.605.076	4.521.475	4.431.000	4.333.364	4.228.269	4.115.409	3.994.465	3.865.110
Plant Balance	PLN/MW	1.400.000	1.430.800	1.462.278	1.494.448	1.527.326	1.560.927	1.595.267	1.630.363	1.666.231
Development	PLN/MW	94.000	96.068	98.181	100.341	102.549	104.805	107.111	109.467	111.876

Exhibit 2: Estimated Polish and European Inflation, and the PPP Exchange Rate

	Expected Values							
Indicators	**2008E**	**2009E**	**2010E**	**2011E**	**2012E**	**2013E**	**2014E**	**2015E**
Poland Harmonised Index of Consumer Prices, (Dec-Dec, %)	2,20%	2,20%	2,20%	2,20%	2,20%	2,20%	2,20%	2,20%
European Harmonised Index of Consumer Prices, Dec-Dec %)	2,33%	2,33%	2,33%	2,33%	2,33%	2,33%	2,33%	2,33%
PPP Exchange rate	3,606	3,611	3,615	3,619	3,624	3,628	3,633	3,637

Exhibit 3: Block 1 Cash Flow

Cash Flows Block 1	Units	2007	2008	2009	2010	...	2027	2028	2029
Price									
Inflation Adjusted BP Revenue	PLN/MWh	0,00	0,00	158,14	161,62		233,97	239,12	
Inflation Adjusted GC Revenue	PLN/MWh	0,00	0,00	244,87	250,26		362,29	370,26	
Total Remuneration	PLN/MWh	0,00	0,00	403,01	411,88		596,25	609,37	
Revenues									
Revenues	PLN	0,00	0,00	127.093.234	129.889.285		188.034.939	192.171.708	0
Operating Expenditure									
Variable O&M	PLN	0,00	0,00	18.445.755	18.851.561		27.290.566	27.890.959	0
Fixed O&M	PLN	0,00	0,00	3.952.662	4.039.620		5.847.979	5.976.634	0
Capital Expenditure									
Turbine Contracts	PLN	168.554.880	386.826.401						
Plant Balance	PLN	50.400.000	120.187.200						
Development	PLN	3.384.000	8.069.712						
Total	PLN	222.338.880	515.083.313						
Depreciation and Amortization									
Accumulated Investment	PLN	222.338.880	737.422.193	737.422.193	737.422.193		737.422.193	737.422.193	737.422.193
Depreciation	PLN	0	0	31.340.443	31.340.443		31.340.443	31.340.443	0
Net Working Capital									
(+) Clients	PLN			16.522.120	16.885.607		24.444.542	24.982.322	0
(-) Capex Suppliers	PLN	-37.797.610	-87.564.163						
(-) Suppliers	PLN			-10.167.459	-10.391.143		-15.042.795	-15.373.737	0
NWC	PLN	-37.797.610	-87.564.163	6.354.662	6.494.464		9.401.747	9.608.585	0
Changes in NWC	PLN	37.797.610	49.766.554	-93.918.825	-139.803		-202.386	-206.838	

Exhibit 4: EDPR's Weighted Average Cost of Capital for Polish 2007 acquisition

Beta					
EDPR Peer	**Levered Raw Beta**	**D/E**	**Tax Rate**	**Unlevered Raw Beta**	**S&P Rating**
EDP Energias De Portugal	0,87	155,37%	20,5%	0,39	A-
Endesa S.a.	1,21	138,69%	21,2%	0,58	A-
Iberdrola S.a.	0,67	134,76%	33,0%	0,35	A-
E.On AG	0,64	26,29%	23,2%	0,53	N.A.
Acciona S.a.	0,83	238,29%	21,0%	0,29	N.A.
Gas Natural SDG S.a.	0,95	N.A.	24,5%	N.A.	A
Enel Green Power	N.A.	N.A.	N.A.	N.A.	A-
Fersa Energias Renovables	N.A.	N.A.	18,6%	N.A.	N.A.
Martifer SGPS S.a.	N.A.	190,40%	24,0%	N.A.	N.A.
Average Unlevered Beta	0,428				
EDP Effective Tax Rate	20,5%				
Target D/E	142,94%				
Levered Beta	0,914				

Cost of Equity		
Assumptions		
Expected EUR Inflation	2,33%	
Expected PLN Inflation	2,20%	
	EUR Rates	**PLN Rates***
10 yr Euro Benchmark	4,30%	4,43%
10yr Euro Swap Rate	4,65%	4,78%
PLN Rf = [(1+EUR Rate)(1+EUR Infl)]/(1+PLN Infl)-1		
PLN RATES		
Country Risk Premium	**1,36%**	
Risk Free Rate	**4,78%**	
Relevered Beta	**0,914**	
Market Risk Premium	**5,5%**	
Cost of Equity	**11,167%**	

Cost of Debt		
Assumptions		
EDP S&P Rating	A-	
Polish Tax Rate	**19%**	
	EUR Rates	**PLN Rates***
10 yr Euro Swap Rate	4,65%	4,78%
BFV 10 yr Corporate Rate	5,13%	5,26%
PLN RATES		
EDP Risk Premium	0,48%	
Risk Free Rate	4,78%	
Total Cost of Debt	**5,26%**	
Cost of Debt after tax	**4,26%**	

EDPR Poland WACC 2007 (PLN)	
Target Capital Structure	
Average D/E of A- rated Peers	142,94%
D/D+E	**58,8%**
E/D+E	**41,2%**
WACC	**7,103%**

Exhibit 5: Block 1 Free Cash Flow

FCF Block 1	Units	2007	2008	(Start) 2009	2010	...	(End) 2028	2029
EBIT	PLN	0	0	73.354.374	75.657.660		126.963.672	0
NOPLAT	PLN	0	0	59.417.043	61.282.705		102.840.574	0
(+)D&A	PLN	0	0	31.340.443	31.340.443		31.340.443	0
(-/+) Changes NWC	PLN	37.797.610	49.766.554	-93.918.825	-139.803		-206.838	9.608.585
(-) CAPEX	PLN	-222.338.880	-515.083.313	0	0		0	0
(+) Terminal Value	PLN							170.932.789
FCF	PLN	-184.541.270	-465.316.760	-3.161.339	92.483.345		133.974.179	180.541.374
Discount Factor	%	1,00	0,93	0,87	0,81		0,24	0,22
Discounted CF		-184.541.270	-434.455.720	-2.755.908	75.275.562		31.706.947	39.893.937
NPV		378.252.738						
IRR		**12,57%**						
IRR/WACC		**1,77**						

Exhibit 6: Adjusted values for the parks (PLN Mln)

	Best Case			Base Case			Worst Case		
Block	Max	Intermediate	Min	Max	Intermediate	Min	Max	Intermediate	Min
Block 1	359,34	302,60	245,86	281,96	237,44	192,92	204,59	172,28	139,98
Block 2	659,61	461,73	263,84	527,96	369,57	211,18	396,31	277,42	158,52
Block 3	154,63	61,85	0,00	120,74	48,30	0,00	86,86	34,74	0,00
Block 4	45,64	0,00	0,00	34,24	0,00	0,00	22,84	0,00	0,00
Total RWP Value	1219,22	826,18	509,71	964,91	655,31	404,11	710,59	484,44	298,51

Exhibit 7: Sensitivity analysis of Block 1&2 profitability to proposed amendments (Discount and License Period)

Block 1

Changing Certificate Period, zero discount

Ceritificate Period	License Period	Discount	NPV	% Change from Original	IRR/WACC
15	30	0%	199,94	-47%	1,41
16	30	0%	226,82	-40%	1,45
17	30	0%	252,48	-33%	1,49
18	30	0%	276,96	-27%	1,52
19	30	0%	300,32	-21%	1,55
20	30	0%	322,61	-15%	1,58

20 year Certificate Period, changing discount

Ceritificate Period	License Period	Discount	NPV	% Change from Original	IRR/WACC
20	30	0%	332,61	-12%	1,58
20	30	1%	315,40	-17%	1,56
20	30	2%	308,18	-19%	1,55
20	30	3%	300,97	-20%	1,54
20	30	4%	293,75	-22%	1,53
20	30	5%	286,00	-24%	1,51
20	30	25%	142,23	-62%	1,26

Block 2

Changing Certificate Period, zero discount

Ceritificate Period	License Period	Discount	NPV	% Change from Original	IRR/WACC
15	30	0%	1.046,88	-21%	1,74
16	30	0%	1.128,96	-14%	1,78
17	30	0%	1.207,27	-8%	1,81
18	30	0%	1.282,00	-3%	1,84
19	30	0%	1.353,31	3%	1,86
20	30	0%	1.421,36	8%	1,88

20 year Certificate Period, changing discount

Ceritificate Period	License Period	Discount	NPV	% Change from Original	IRR/WACC
20	30	0%	1.421,36	8%	1,88
20	30	1%	1.399,33	6%	1,87
20	30	2%	1.377,31	4%	1,86
20	30	3%	1.355,28	3%	1,84
20	30	4%	1.333,26	1%	1,83
20	30	5%	1.311,23	-1%	1,82
20	30	25%	870,73	-34%	1,55

Exhibit 8: EDPR's Weighted Average Cost of Capital for Poland 2012

Beta					
EDPR Peer	Levered Raw Beta	D/E	Tax Rate	Unlevered Raw Beta	S&P Rating
EDP Renovaveis S.a.	0,98	74,45%	23,63%	0,62	N.A.
EDP Energias De Portugal	0,83	176,37%	16,35%	0,34	BB+
Endesa S.a.	0,85	50,81%	27,73%	0,62	BBB+
Iberdrola S.a.	1,09	99,23%	15,90%	0,59	BBB+
E.On AG	1,03	79,19%	23,95%	0,64	A-
Acciona S.a.	1,00	171,76%	24,11%	0,43	N.A.
Gas Natural SDG S.a.	0,76	143,27%	24,53%	0,37	BBB
Enel Green Power	N.A.	72,02%	35,43%	N.A.	BBB+
Fersa Energias Renovables	0,91	N.A.	N.A.	N.A.	N.A.
Martifer SGPS S.a.	1,17	152,12%	N.A.	N.A.	N.A.
Average Unlevered Beta	0,517				
EDP Effective Tax Rate	16,4%				
Target D/E	160,88%				
Levered Beta	1,212				

Cost of Equity		
Assumptions		
Expected EUR Inflation	2,33%	
Expected PLN Inflation	2,20%	
	EUR Rates	**PLN Rates***
10 yr Euro Benchmark	2,47%	2,60%
10yr Euro Swap Rate	2,38%	2,51%
PLN Rf = [(1+EUR Rate)(1+EUR Infl)]/(1+PLN Infl)-1		
PLN RATES		
Country Risk Premium	**3,29%**	
Risk Free Rate	**2,51%**	
Relevered Beta	**1,212**	
Market Risk Premium	**5,5%**	
Cost of Equity	**12,469%**	

Cost of Debt		
Assumptions		
EDP S&P Rating	BB+	
Polish Tax Rate	**19%**	
	EUR Rates	**PLN Rates***
10 yr Euro Swap Rate	2,38%	2,51%
BFV 10 yr Corporate Rate	5,99%	6,12%
PLN RATES		
EDP Risk Premium	3,61%	
Risk Free Rate	2,51%	
Total Cost of Debt	**6,12%**	
Cost of Debt after tax	**4,96%**	

EDPR Poland WACC 2007 (PLN)	
Target Capital Structure	
Average D/E of BB+ rated Peers	160,88%
D/D+E	**61,7%**
E/D+E	**38,3%**
WACC	**7,837%**

Exhibit 9: Block 4 value in 2012 (assuming the 2011 amendments to Polish Renewable Energy Act are accepted)

	Units	2011	2012	2013	2014	2015	...	2034	2035
EBIT	PLN	0,00	0,00	0,00	0,00	79.584.302,99		54.495.753,14	0,00
NOPLAT	PLN	0,00	0,00	0,00	0,00	64.463.285,42		44.141.560,04	0,00
(+)D&A	PLN	0,00	0,00	0,00	0,00	47.975.324,86		47.975.324,86	0,00
(-/+) Changes NWC	PLN	0,00	0,00	58.154.594,89	75.592.109,67	-142.209.020,92		-178.134,97	8.275.178,89
(-) CAPEX	PLN	0,00	0,00	-342.085.852,28	-786.745.320,93	0,00		0,00	0,00
(+) Terminal Value	PLN								261.660.501,36
FCF	PLN	0,00	0,00	-283.931.257,39	-711.153.211,26	-29.770.410,64		91.938.749,94	269.935.680,25
Discount Factor	%		1,00	0,93	0,86	0,80		0,19	0,18
Discounted CF		0,00	0,00	-263.295.982,52	-611.540.507,10	-23.739.846,45		17.481.600,20	47.596.378,53
NPV	PLN	96.553.510,84							
IRR	**%**	**9,02%**							
IRR/WACC	**%**	**1,15**							